CLIMATEMASTER®

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COMMERCIAL

TRANQUILITY® CONSOLE (SD) SERIES

INSTALLATION, OPERATION & MAINTENANCE MANUAL

Part#: 97B0163N01 | Updated: August 21, 2024

Models: SD 09-18

60Hz – R-454B

Preliminary

Models:
SD
09-18

Table of Contents

Model Nomenclature

Models:
SD
09-18

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
S	D	M	T	0	9	A	G	C	S	0	C	S	P	S

PRODUCT NAME
S = R-454B Refrigerant

MODEL TYPE
D = Console Water-Source Series

CABINET, RETURN, AND COLOR

Option	Polar Ice		Bright White	
	Bottom	Front	Bottom	Front
Standard	B	F	D	G
Locking Control Door	L	C	M	Q
Extended Vabinet	E	A	H	J
No Cabinet	N	T	P	R

SUBBASE

Color	Size	No Damper	Damper
No Subbase	None	N	-
Black	*3"	3	T
	5"	5	F
Bright White	*3"	4	U
	5"	6	G

SIZE
09 15
12 18

REVISION
A = Current

VOLTAGE
A = 115-1-60
G = 208/230-1-60
E = 265-1-60
B = 115-1-60 Refrigerant Detection System
J = 208/230-1-60 Refrigerant Detection System
D = 265-1-60 Refrigerant Detection System

CONTROLS

CXM2	Unit Mounted		Remote Tstat	Remote Wall Sensor/ Internally Mounted MPC
	CM100 Tstat	CM300 Tstat		
Field Connected	A	F	R	L
Disconnect	B	G	S	M
Circuit Breaker	C	H	T	N
Plug and Cord	D	J	U	P
Receptacle with Disc and Plug	E	K	V	Q

STANDARD
S = Standard

BLOWER MOTOR
P = PSC
T = Constant Torque (CT) EC

COPPER CONNECTIONS

Pipe Location	Right	Left
Sweat	R	L
FPT	S	M
MPT	T	N

DRAIN PAN/HEAT EXCHANGER OPTIONS
C = Standard Drain Pan, Non-Coated Air Coil
S = Stainless Steel Drain Pan, Non-Coated Air Coil

WATER OPTIONS

Option	Description
0	None
M	Motorized Water Valve
C	Modulating Valve, Low System Pressure Drop
7	Internal Secondary Pump
A	AFR 2.25 GPM/ton
W	MWV and AFR 2.25 GPM/ton
F	AFR 3.0 GPM/ton
T	MWV and AFR 3.0 GPM/ton

CHASSIS OPTIONS

Range	UltraQuiet	
Extended Range	No	E
	Yes	F
Standard	No	S
	Yes	T

*If a 3-inch subbase is selected, the blower motor's LOW speed tap cannot be utilized. Use ClimateMaster's selection software at https://climatemastersolutions.com/eRep/ to configure your Tranquility SD model.

Models:
SD
09-18

Attentions, Cautions, and Warnings

SAFETY

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

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

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

CAUTION: Indicates a potentially hazardous situation or an unsafe practice, which if not avoided could result in minor or moderate injury or product or property damage.

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

⚠ WARNING

Disconnect power supply(ies) before servicing. Refer servicing to qualified service personnel. Electric shock hazard. May result in injury or death!

⚠ WARNING

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

⚠ WARNING

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

⚠ WARNING

The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).

⚠ WARNING

If unit connected via an air duct system to one or more rooms with R-454B is installed in a room with an area less than Amin or has an Effective Dispersal Volume less than minimum, that room shall be without continuously operating open flames or other POTENTIAL IGNITION SOURCES. A flame-producing device may be installed in the same space if the device is provided with an effective flame arrest.

⚠ WARNING

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

⚠ WARNING

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

An unventilated area where the appliance using FLAMMABLE REFRIGERANTS is installed shall be so constructed that should any refrigerant leak, it will not stagnate so as to create a fire or explosion hazard.

⚠ WARNING

Auxillary devices which may be a POTENTIAL IGNITION SOURCE shall not be installed in the duct work. Examples of such POTENTIAL IGNITION SOURCES are hot surfaces with a temperature exceeding 1,292°F (700°C)

⚠ WARNING

An unventilated area where a water source heat pump is installed and surpasses a R-454B refrigerant charge of 62 oz (1.76 kg), shall be without continuously operating open flames (for example an operating gas appliance) or other POTENTIAL IGNITION SOURCES (for example, an operating electric heater, hot surfaces).

⚠ WARNING

Only auxiliary electric heaters approved by ClimateMaster shall be installed in connecting ductwork. The installation of any other auxiliary devices is beyond ClimateMaster's responsibility.

⚠ WARNING

For mechanical ventilation, the lower edge of the air extraction opening where air is exhausted from the room shall not be more than 3.94 inches (100 mm) above the floor. The location where the mechanical ventilation air extracted from the space is discharged shall be separated by a sufficient distance, but not less than 9.84 feet (3 m), from mechanical ventilation air intake openings, to prevent recirculation to the space.

⚠ WARNING

Children being supervised are NOT to play with the appliance.

⚠ WARNING

Do not pierce or burn.

⚠ WARNING

Be aware that refrigerants may not contain odor.

Attentions, Cautions, and Warnings

Models:
SD
09-18

⚠ 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

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.

⚠ 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.

⚠ CAUTION

All three phase scroll compressors must have direction of rotation verified at startup. 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.

⚠ NOTICE

Servicing shall be performed only as recommended by the manufacturer.

⚠ NOTICE

REFRIGERANT SENSORS for REFRIGERANT DETECTION SYSTEMS shall only be replaced with sensors specified by the appliance manufacturer.

⚠ NOTICE

An unconditioned attic is not considered natural ventilation.

⚠ NOTICE

Maximum external statics must be adhered to in order to maintain minimum CFM.

⚠ NOTICE

LEAK DETECTION SYSTEM installed. Unit must be powered except for service.

Models:
SD
09-18

General Information

INSPECTION

Upon receipt of the equipment, carefully check the shipment against the bill of lading. Make sure all units have been received. Inspect the 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 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. You may stack vertical configurations a maximum of two units high and horizontal configurations a maximum of three 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 startup and may result in costly equipment cleanup.

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

PRE-INSTALLATION

Installation, Operation, and Maintenance instructions are provided with each unit. Horizontal equipment is designed for installation 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 startup, 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.

CHECKS TO THE AREA

Prior to beginning work on systems containing FLAMMABLE REFRIGERANTS, safety checks are necessary to ensure that the risk of ignition is minimized. For repair to the REFRIGERATING SYSTEM, these steps shall be completed prior to conducting work on the system.

General Information

Models:
SD
09-18

Work Procedure

Work shall be undertaken under a controlled procedure so as to minimise the risk of a flammable gas or vapor being present while the work is being performed.

General Work Area

All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.

Checking for presence of refrigerant

The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.

Presence of fire Extinguisher

If any hot work is to be conducted on the refrigeration equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.

No ignition sources

No person carrying out work in relation to a REFRIGERATION SYSTEM which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. "No Smoking" signs shall be displayed.

Ventilated area

Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

Checks to the Refrigeration Equipment

The following checks shall be applied to installations using FLAMMABLE REFRIGERANTS:

- The actual REFRIGERANT CHARGE is in accordance with the room size within which the refrigerant containing parts are installed;
- The ventilation machinery and outlets are operating adequately and are not obstructed;
- If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant;
- Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected;
- Refrigerant piping or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

Checks to Electrical Devices

Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised.

Initial safety checks shall include:

- Capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;
- That no live electrical components and wiring are exposed while charging, recovering, or purging the system;
- That there is continuity of earth bonding.

Models:
SD
09-18

General Information

REPAIR TO INTRINSICALLY SAFE COMPONENTS

Intrinsically safe components must be replaced.

CABLING

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

REQUIRED AREA FOR INSTALLATION

The minimum room area of the space (A_{min}) or a minimum room area of conditioned space (T_{amin}) shall be corrected for unit's location altitude by multiplying A_{min} or T_{amin} by the applicable altitude adjustment factor (AF) for building ground-level altitude (H_{alt}) in feet or meters, as shown in Table 1.

NOTE: You can use Imperial or Metric measurements to calculate A_{min} or T_{amin}.

Table 1: Altitude Adjustment

H_{alt} ft (m)	AF
0 (0)	1.00
656 (200)	1.00
1,312 (400)	1.00
1,968 (600)	1.00
2,624 (800)	1.02
3,280 (1,000)	1.05
3,937 (1,200)	1.07
4,593 (1,400)	1.10
5,249 (1,600)	1.12
5,905 (1,800)	1.15
6,561 (2,000)	1.18
7,217 (2,200)	1.21
7,874 (2,400)	1.25
8,530 (2,600)	1.28
9,186 (2,800)	1.32
9,842 (3,000)	1.36
10,498 (3,200)	1.40

Refrigerant System Servicing

Models:
SD
09-18

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.

Removal and Evacuation

When breaking into the refrigerant circuit to make repairs - or for any other purpose - conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration. The following procedure shall be adhered to:

- Safely remove refrigerant following local and national regulations
- Evacuate
- Purge the circuit with Inert gas
- Evacuate
- Continuously flush or purge with Inert gas when using flame to open circuit
- Open the circuit.

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems.

For appliances containing flammable refrigerants, refrigerant purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum (optional for FLAMMABLE REFRIGERANT). This process shall be repeated until no refrigerant is remains in the system (optional for FLAMMABLE REFRIGERANT). When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.

The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.

Charging Procedures

In addition to conventional charging procedures, the following requirements shall be followed:

- Ensure that contamination of different refrigerants does not occur when using charging equipment.
- Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
- Cylinders shall be kept in an appropriate position according to the instructions.
- Ensure that the REFRIGERATION SYSTEM Is earthed prior to charging the system with refrigerant.
- Label the system when charging is complete (if not already).
- Extreme care shall be taken not to overfill the REFRIGERATION SYSTEM.

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

Leak Detection

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.

The following leak detection methods are deemed acceptable for all refrigerant systems.

Electronic leak detectors may be used to detect refrigerant leaks but, in the case of FLAMMABLE REFRIGERANTS, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.)

Models:
SD
09-18

Refrigerant System Servicing

Ensure that the detector is not a potential source of Ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the lower flammability limit of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25% maximum) is confirmed.

Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

NOTE:
Examples of leak detection fluids are:

- Bubble method
- Fluorescent method agents

If a leak is suspected, all naked flames shall be removed/extinguished.

If a refrigerant leak that requires brazing is identified, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Removal of refrigerant shall be according to Removal and Evacuation section.

DECOMMISSIONING

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task is commenced.

1. Become familiar with the equipment and its operation.
2. Isolate system electrically.
3. Before attempting the procedure, ensure that:
   - Mechanical handling equipment is available, if required, for handling refrigerant cylinders.
   - All personal protective equipment is available and being used correctly.
   - The recovery process is supervised at all times by a competent person.
   - Recovery equipment and cylinders conform to the appropriate standards.
4. Pump down refrigerant system, if possible.
5. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
6. Make sure that cylinder is situated on the scales before recovery takes place.
7. Start the recovery machine and operate in accordance with instructions.
8. Do not overfill cylinders (no more than 80 % volume liquid charge).
9. Do not exceed the maximum working pressure of the cylinder, even temporarily.
10. When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
11. Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

Labeling - Upon decommissioning, equipment shall be labeled stating that is has been decommissioned and emptied of refrigerant. The label shall be dated and signed.

Refrigerant System Servicing

Models:
SD
09-18

RECOVERY

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labeled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant. If in doubt, the manufacturer should be consulted.

In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition.

The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely.

Models:
SD
09-18

Physical Data

SD Console Series

Unit Size	09	12	15	18
Number of Refrigerant Circuits	1			
Factory Charge R-454B (oz) [kg]	22 [0.62]	23 [0.65]	26 [0.74]	31 [0.88]
Refrigerant Leak Detection System	Optional			
Refrigerant Leak Detection Sensors	1			
Water Connection Size				
O.D. Sweat (in) [mm]	1/2 [12.7]			3/4 [19.1]
Optional FPT Fittings (in)	1/2 [12.7]			3/4 [19.1]
Optional MPT Fittings (in)	1/2 [12.7]			3/4 [19.1]
Condensate Connection Size				
I.D. Vinyl Hose (In) [mm]	5/8 [15.9]			
Filter Size				
Bottom Return (in)	10 x 30 x 1			10 x 36 x 1
Front Return (In)	7 x 29.5 x 0.125			7 x 37.5 x 0.125
Weight - Operating, (lbs) [kg]	175 [79.3]	180 [81.6]	190 [86.2]	220 [99.8]
Weight - Packaged, (lbs) [kg]	185 [83.9]	190 [86.2]	200 [90.7]	232 [105.2]

FPT = Female Pipe Thread
MPT = Male Pipe Thread

Optional Auto-Flow Valve

Model	2.25 GPM/ Ton [0.142 LPS/Ton]	3 GPM/Ton [0.189 LPS/ Ton]
SD09	2.0 [0.126]	2.5 [0.158]
SD12	2.5 [0.158]	3.0 [0.189]
SD15	3.0 [0.189]	3.5 [0.221]
SD18	3.5 [0.221]	4.0 [0.252]

Installation

Models:
SD
09-18

The installation of console water-source heat pumps and all associated components, parts, and accessories that 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.

NOTE: An installation checklist is provided in this manual. Complete this checklist after all installation procedures are completed. A periodic maintenance checklist provided in the Maintenance section outlines recommended maintenance schedules. A startup inspection log is also included at the end of this manual to encourage thorough unit checkout at initial startup. These checklists are not a substitute for the detailed information found in the Installation section of this manual.

1. Console units are typically installed along an outside wall of the room. Provide adequate space in front of the unit for service and maintenance. Locate the console unit so that it provides adequate air circulation throughout the room.
2. Unpack the console unit from the shipping carton. Remove the front cabinet by lifting up and away from the backplate. Protect the cabinet from damage during installation by returning it to its original packaging until required.
3. Using a carpenter's square and a level, ensure the unit is level. Shim the unit if necessary to assure proper installation.
4. Select the proper fasteners to connect the backplate securely to the wall.
5. Fasten the backplate onto the wall through the screw holes located in the back flange. Secure the subbase in place for bottom return units only.
6. Remove subbase shipping support bracket and discard.
7. Make all necessary electrical connections as described in the Electrical Wiring section of this manual. Consult the wiring diagram to ensure proper wiring.

⚠ CAUTION

Poor or inadequate installation may result in noisy unit operation or unattractive installation.

8. Connect the final piping as described in the Supply and Return Piping and Condensate Piping section of the manual. Install shut-off valves, piping and/or hoses and other accessories as specified.
9. Before making the final water connections, flush the system as described in the Startup section of this manual. After flushing the system, connect piping and hoses to the proper supply, return and condensate connections of the unit.

   NOTE: When necessary, use adapters to connect hoses.
10. Install any other system components as required following manufacturer's instructions.

    NOTE: When using replacement 3-inch subbase, unit will not be able to use low fan speed setting. When using a 5-inch subbase, low fan speed setting is allowed.
11. After startup, reinstall the front cabinet by carefully lowering the front cabinet over the chassis onto the backplate.

SUPPLY AND RETURN HOSES

Optional pressure-rated hose assemblies 400 psi (2758 kPa) are available for use with console units. Use the following guidelines when installing supply and return hose assemblies.

1. Install supply and return hoses fitted with swivel-joint fittings at one end to prevent the hose from twisting.
2. Use adapters to secure the hose assembly to the unit and the riser.
3. Do not allow the hose to twist during installation. Twisting may damage the hose wall or the interior rubber compound.
4. Use pipe-joint compound sparingly on the pipe threads of the fitting adapters.
5. Prevent sealant from reaching the flared surfaces of the joint.
6. Do not use pipe-joint compound when pipe thread sealant tape is pre-applied to hose assemblies or when flared-end connections are used.

7. Maximum torque which may be applied to brass fittings is 30 ft-lbs (41 N-m). When a torque wrench is not used, tighten brass fittings finger-tight plus one quarter turn.
8. Tighten steel fittings as necessary.
9. Shut-off/balancing valves, flow indicators, and drain tees in the supply runout and return at each floor to aid in loop balancing and servicing.

CONDENSATE PIPING

Unit is supplied with condensate drain hose, ⅝-inch (16 mm) I.D. flexible plastic nonpressure-rated, protruding from piping side of unit. Connect this hose to building drain. Avoid making kinks in hose to ensure an unobstructed flow of condensate from the unit to the drain. DO NOT twist, pull hose out, or push excess hose into unit. If hose will not connect to your building drain several options include, relocate end of building drain, add to or cut hose, use hard plastic or copper elbow fittings for tight radii (put inside hose). Keep hose positioned within or over subbase area so hose does not interfere with front cabinet. Cabinet should not push or reroute hose. Clamp all joints watertight. Check for leaks.

Internally the drain hose is clamped to drain pan and pitched correctly. Horizontal runs of condensate hose should be pitched downward ¼-inch minimum for every foot (10 mm per 46 cm) of hose. Avoid low points because dirt collects in these areas and may cause blockage. If blocked the condensate level in drain pan increases. When the level gets too high, the console unit has sensor switch that will shut unit off. Overflow may still occur.

If the building drain connection is parallel with floor, the height can be up to 1½ inches (38 mm) above the subbase for proper pitch and correct drainage. Up to 5 inches (127 mm) above the subbase is allowable, but drainage will be slower. When the drain connection is 2½- to 5-inches (64- to 127-mm) above, the hose inside the unit will act as a trap. Heights of more than 5-inches (127-mm) above the subbase are NOT allowable (condensate overflow may occur). If the unit has a disconnect option, drain locations are limited. See unit configuration pages for details.

Field installation of a trap or vent is not required unless specified by local codes. Console units are designed in a blow-through configuration. The condensate-drain pan is located on the outlet side of the blower so that the pressure in the drain pan is higher than atmospheric pressures.

When the drain connection is completed, check for proper drainage and leaks. Correct if necessary.

If a trap is used, check and clean often. See Preventive Maintenance Instructions.

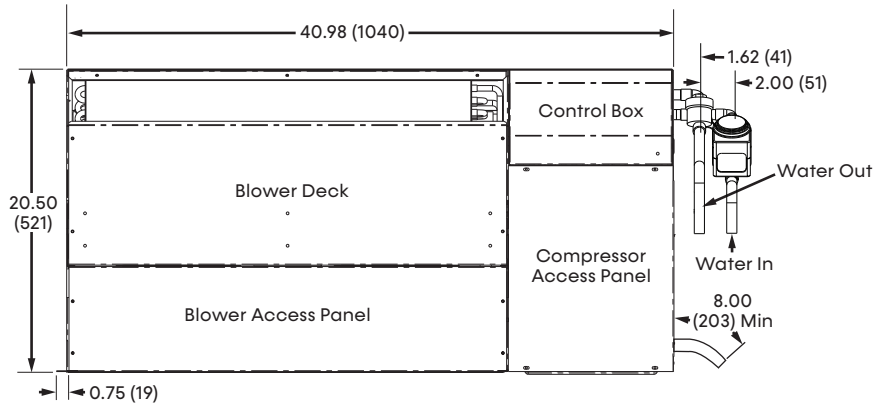
⚠ CAUTION

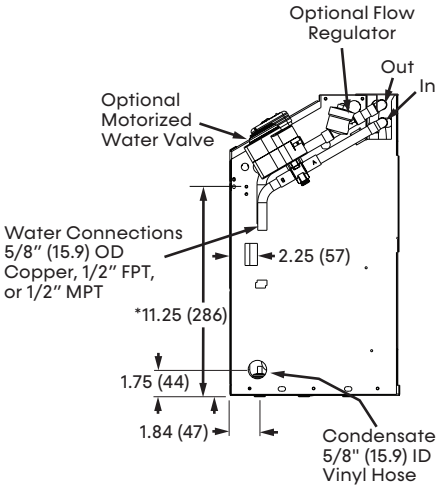
Loop fluids should be of good quality with no more than 0.50 ppm of chlorides w/copper heat exchangers (125 ppm w/ Cupro-nickel) to prevent corrosion and should also be filtered to a maximum 800 micron [0.8mm particle size to prevent erosion of the heat exchangers.

Piping Details Sizes 09-15

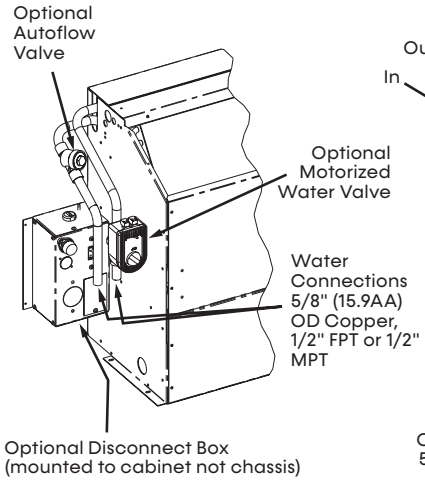
Models:
SD
09-18

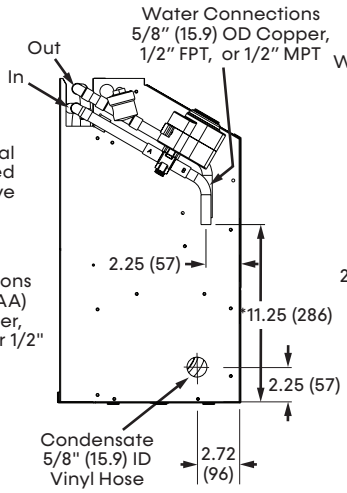
Right Hand Configuration

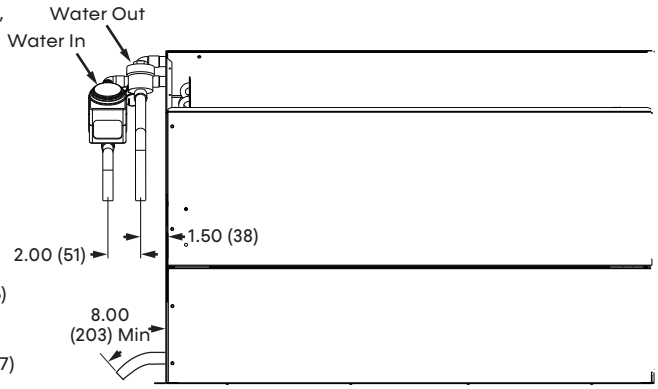




Left Hand Configuration







Notes:
1. * Dimension reduced by fitting if selected

⚠ CAUTION

Corrosive system water requires corrosion resistant fittings and hoses, and may require water treatment.

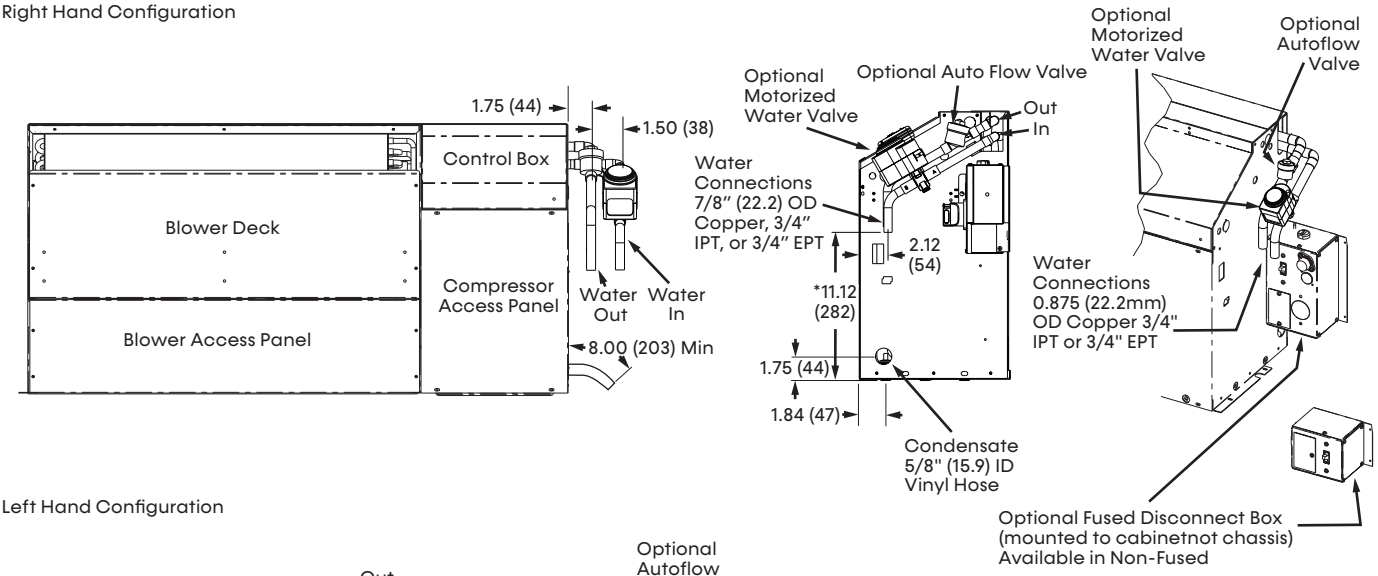
⚠ CAUTION

Piping must comply with all applicable codes.

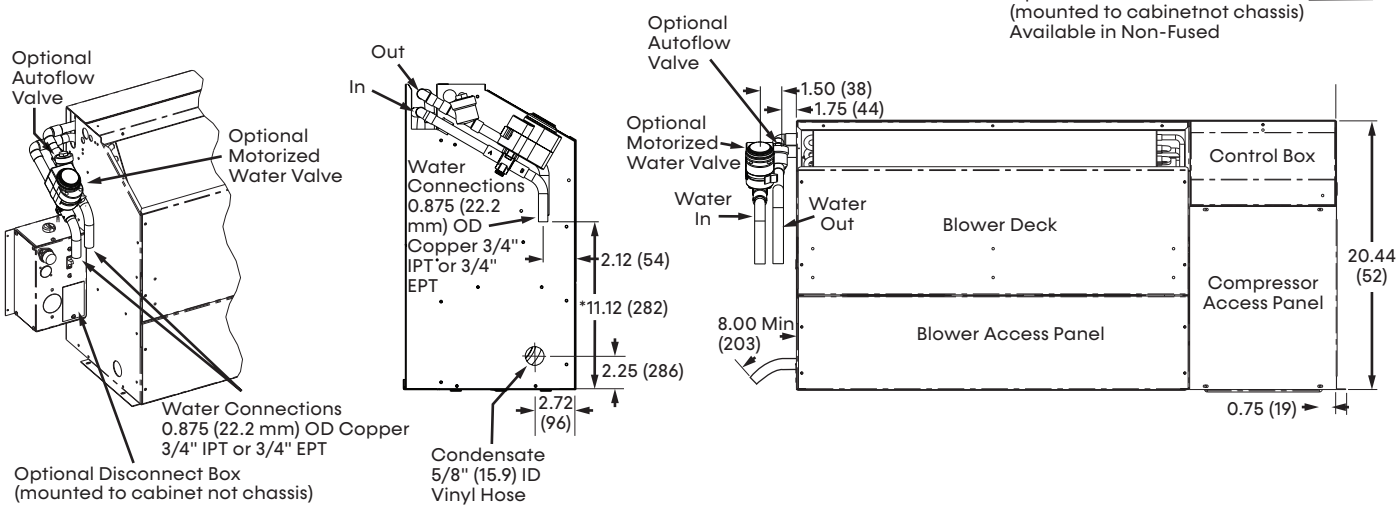
Models:
SD
09-18

Piping Details
Size 18

Right Hand Configuration



Left Hand Configuration



Notes:
1. * Dimension reduced by fitting if selected

⚠ CAUTION

Corrosive system water requires corrosion resistant fittings and hoses, and may require water treatment.

⚠ CAUTION

Piping must comply with all applicable codes.

Piping Connections

Models:
SD
09-18

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 2. 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 water-thread sealant 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, insure that it is compatible with the water-thread sealant tape or pipe joint compound that is applied.

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

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

Refer to Figure 1 for an illustration of a 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.

⚠ WARNING

Polyolester Oil, commonly known as POE oil, is a synthetic oil used in many refrigeration systems including those with R-454B 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 R-454B as system failures and property damage may result.

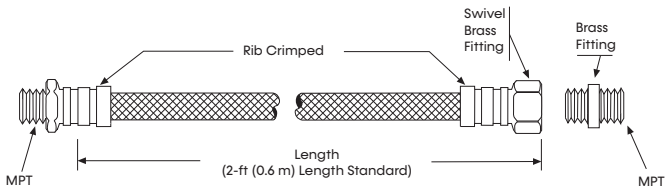
⚠ CAUTION

Do not bend or kink supply lines or hoses.

Table 2: Metal Hose Minimum Bend Radii

Hose Diameter	Minimum Bend Radii
1/2" [12.7 mm]	2-1/2" [6.4 cm]
3/4" [19.1 mm]	4" [10.2 cm]
1" [25.4 mm]	5-1/2" [14 cm]
1-1/4" [31.8 mm]	6-3/4" [17.1 cm]

Figure 1: Supply/Return Hose Kit



⚠ 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.

Models:
SD
09-18

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. The manufacturer recommends piping insulation any time the water temperature is below 60°F (15.6°C). Metal to plastic threaded joints should never be used due to their tendency to leak over time.

Water thread sealant tape or 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 the manufacturer in different configurations 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 with blow down valve, auto-flow valve and swivel connections.

The piping system should be flushed to remove dirt, piping chips, and other foreign material prior to operation (see Piping System Cleaning and Flushing in this manual). The flow rate is usually set between 2.25 and 3.5 GPM per ton (2.9 and 4.5 l/m per kW) of cooling capacity. The manufacturer recommends 3 GPM per ton (3.9 l/m per kW) for most water-loop heat pump applications. To ensure proper maintenance and servicing, P/T ports are imperative for temperature, flow verification, and performance checks.

Water-loop heat pump (cooling tower/boiler) systems typically utilize a common loop, maintained between 60 - 90°F (16 - 32°C). The use of a closed circuit evaporative cooling tower with a secondary heat exchanger between the tower and the water loop is recommended. If an open type cooling tower is used continuously, chemical treatment and filtering will be necessary.

Ground-Loop Heat Pump Application

Models:
SD
09-18

⚠ 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

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

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 25 and 110°F (-4 to 43°C). Flow rates between 2.25 and 3 GPM (2.41 to 3.23 l/m per kW) of cooling capacity is recommended in these applications.

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

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 40°F (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 15°F (9°C) below the lowest expected entering loop temperature. For example, if 30°F (-1°C) is the minimum expected entering loop temperature, the leaving loop temperature would be 22 to 25°F (-6 to -4°C) and freeze protection should be at 15°F (-10°C).

Calculation is as follows:

30°F - 15°F = 15°F [-1°C - 9°C = -10°C]

All alcohols should be premixed and pumped from a reservoir outside of the building when possible or introduced under the water level to prevent fumes. Calculate the total volume of fluid in the piping system. Then use the percentage by volume shown in the table below for the amount of antifreeze needed. Antifreeze concentration should be checked from a well mixed sample using a hydrometer or refractometer to measure specific gravity.

Table 3: Antifreeze Percentages by Volume

Type	Minimum Antifreeze Concentration % for Low Temperature Protection			
	10°F [-12.2°C]	15°F [-9.4°C]	20°F [-6.7°C]	25°F [-3.9°C]
Methanol	25%	21%	16%	10%
100% USP food grade Propylene Glycol	38%	25%	22%	15%
Ethanol*	29%	25%	20%	14%

* Must not be denatured with any petroleum based product

Models:
SD
09-18

Water Quality Requirements

Table 4: Water Quality Requirements

Clean water is essential to the performance and life span of water source heat pumps. Contaminants, chemicals, and minerals all have the potential to cause damage to the water heat exchanger if not treated properly. All closed-loop water systems should undergo water quality testing and be maintained to the water quality standards listed in this table. All open-loop water systems shall be tested upon installation and periodically to ensure water quality standard in the table below are met.

Water Quality Requirements
For Closed-Loop and Open-Loop Systems

	Description	Symbol	Units	Heat Exchanger Type			
				Closed Loop Recirculating		Open Loop, Tower, Ground Source Well	
				All Heat Exchanger Types	Coaxial HX Copper Tube in Tube	Coaxial HX Cupronickel	Brazed-Plate HX 316 SS
Scaling Potential	pH - Chilled Water <85°F			7.0 to 9.0	7.0 to 9.0	7.0 to 9.0	7.0 to 9.0
	pH - Chilled Water >85°F			8.0 to 10.0	8.0 to 10.0	8.0 to 10.0	8.0 to 10.0
	Alkalinity	($HCO3^-$)	ppm - $CaC0_3$ equivalent	50 to 500	50 to 500	50 to 500	50 to 500
	Calcium	(Ca)	ppm	<100	<100	<100	<100
	Magnesium	(Mg)	ppm	<100	<100	<100	<100
	Total Hardness	(CaC03)	ppm - $CaC0_3$ equivalent	30 to 150	150 to 450	150 to 450	150 to 450
	Langelier Saturation Index	LSI		-0.5 to +0.5	-0.5 to +0.5	-0.5 to +0.5	-0.5 to +0.5
	Ryznar Stability Index	RSI		6.5 to 8.0	6.5 to 8.0	6.5 to 8.0	6.5 to 8.0
Corrosion Prevention	Total Dissolved Solids	(TDS)	ppm - $CaC0_3$ equivalent	<1000	<1000	<1000	<1000
	Sulfate	(SO_4^{2-})	ppm	<200	<200	<200	<200
	Nitrate	(NO_3^-)	ppm	<100	<100	<100	<100
	Chlorine (free)	(Cl)	ppm	<0.5	<0.5	<0.5	<0.5
	Chloride (water < 80°F)	(Cl^-)	ppm	<20	<20	<150	<150
	Chloride (water > 120°F)	(Cl^-)	ppm	<20	<20	<125	<125
	Hydrogen Sulfide[α]	(H_2S)	ppb	<0.5	<0.5	<0.5	<0.5
	Carbon Dioxide	(CO_2)	ppm	0	<50	10 to 50	10 to 50
	Iron Oxide	(Fe)	ppm	<1.0	<1.0	<1.0	<0.2
	Manganese	(Mn)	ppm	<0.4	<0.4	<0.4	<0.4
	Ammonia	(NH_3)	ppm	<0.05	<0.1	<0.1	<0.1
	Chloramine	(NH_2CL)	ppm	0	0	0	0
Fouling & Biological	Iron bacteria		cells/mL	0	0	0	0
	Slime-forming bacteria		cells/mL	0	0	0	0
	Sulfate-reducing bacteria		cells/mL	0	0	0	0
	Suspended Solids[β]	(TSS)	ppm	<10	<10	<10	<10
Electrolysis All HX types	Earth Ground Resistance[χ]		Ohms		Consult NEC and local electrical codes for grounding requirements		
	Electrolysis Voltage[δ]		mV		Measure voltage and internal water loop to HP ground		
	Leakage Current[δ]		mA		Measure current in water loop pipe		
	Building Primary Electrical Ground to unit, must meet local diameter and penetration length requirements. Do not connect heat pump to steel pipe unless dissimilar materials are separated by using Di-electric unions. Galvanic corrosion of heat pump water pipe will occur						

Water Quality Requirements

Models:
SD
09-18

1. The Water Quality Table provides water quality requirements for coaxial and brazed-plate heat exchangers.
2. The water must be evaluated by an independent testing facility comparing site samples against this table. When water properties are outside of these parameters, the water must either be treated by a professional water treatment specialist to bring the water quality within the boundaries of this specification, or an external secondary heat exchanger must be used to isolate the heat pump water system from the unsuitable water. Failure to do so will void the warranty of the heat pump system and will limit liability for damage caused by leaks or system failure.
3. Regular sampling, testing and treatment of the water is necessary to assure that the water quality remains within acceptable levels thereby allowing the heat pump to operate at optimum levels.
4. If closed-loop systems are turned off for extended periods, water samples must be tested prior to operating the system.
5. For optimal performance, it is recommended that the closed-loop piping systems are initially filled with de-ionized water.
6. Well water with chemistry outside of these boundaries, and salt water or brackish water requires an external secondary heat exchanger. Surface/Pond water should not be used.
7. If water temperature is expected to fall below 40°F (4.4°C), antifreeze is required. Refer to the heat pump IOM for the correct solution ratios to prevent freezing.

Strainer / Filter Sizing

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

ppm = parts per million
ppb = parts per billion

α Hydrogen Sulfide has an odor of rotten eggs. If one detects this smell, a test for H_2S must be performed. If H_2S is detected above the limit indicated, remediation is necessary (Consult with your Water Testing/Treatment Professional) or a secondary heat exchanger is required using appropriate materials as recommended by the heat exchanger supplier.

β Suspended solids and particulates must be filtered to prevent fouling and failure of heat exchangers. Strainers or particulate filters must be installed to provide a maximum particle size of 600 micron (0.60 mm, 0.023 inch) using a 20 to 30 mesh screen size. When a loop is installed in areas with fine material such as sand or clay, further filtration is required to a maximum of 100 micron. Refer to the Strainer / Filter Sizing Chart to capture the particle sizes encountered on the site.

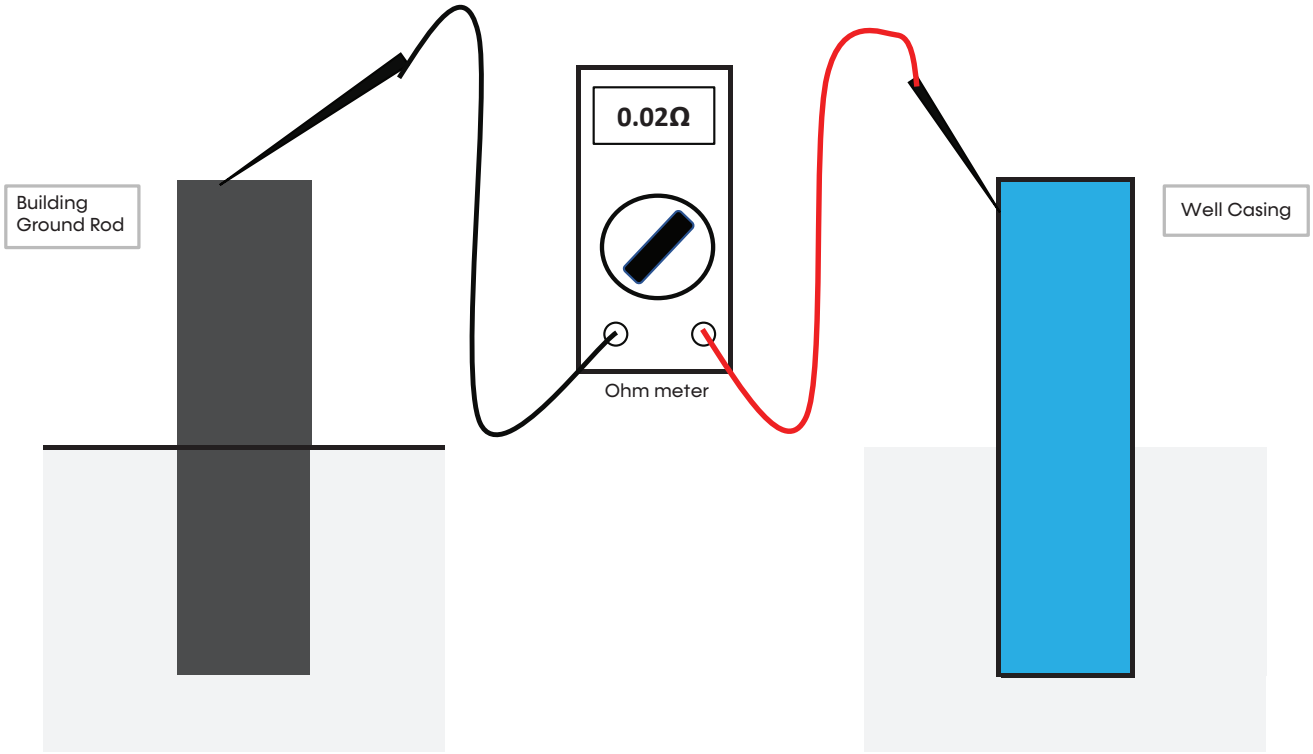
χ The WSHP piping system or other plumbing pipes must not be used as the building ground. An electrical grounding system using a dedicated ground rod meeting NEC and local electrical codes must be installed.

δ Refer to the Antifreeze Percentages by Volume table for instructions on measuring resistance and leakage currents within water loops.

Models:
SD
09-18

Water Quality Requirements

Measuring Earth Ground Resistance for Ground-Water Applications



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

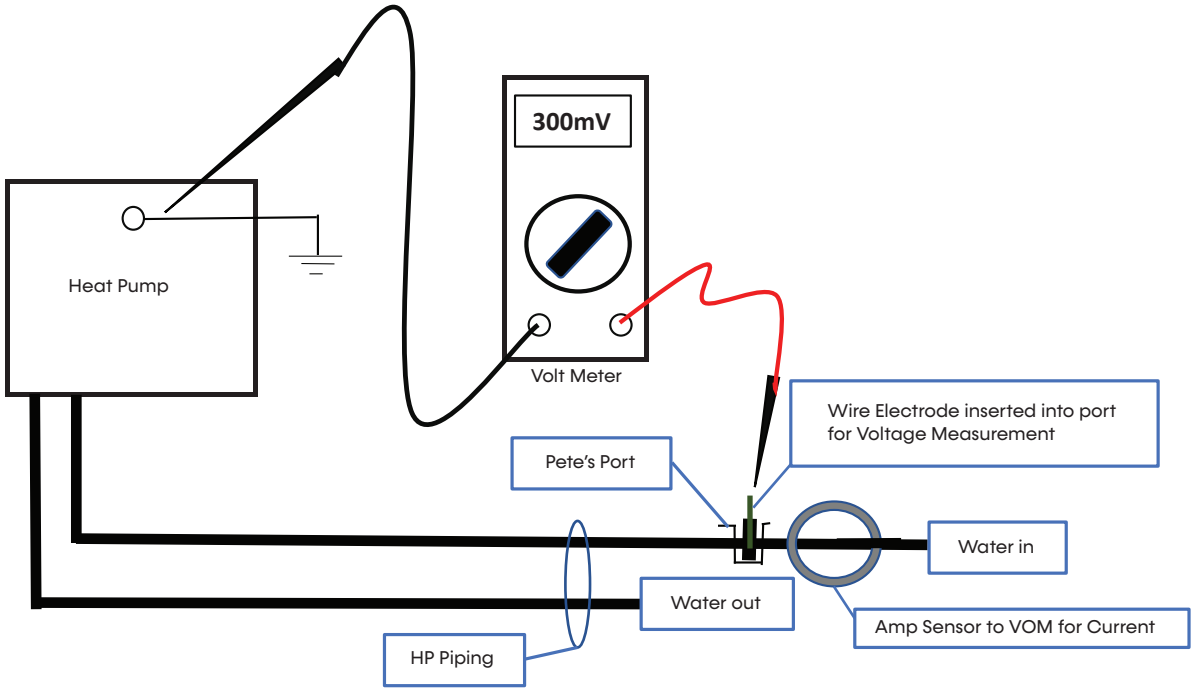
The resistance measured should be zero Ohms. The NEC allows a resistance to ground up to 20 Ohms. Any resistance above zero indicates a poor earth ground, which may be the result of a hot neutral line or that conductive water is present. Both of these may lead to electrolysis and corrosion of the heat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

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

Water Quality Requirements

Models:
SD
09-18

Measuring Electrolysis, Voltage, and Current for Ground-Water Applications



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

The heat pump must be operating and the water stream flowing.

The voltage measured should be less than 300mV (0.300V). If the voltage is higher than 500mV, electrolysis will occur and corresion will result.

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

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

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

Models:
SD
09-18

Electrical Data
PSC Blower Motor

No Interal Secondary Pump

Model	VOLTAGE CODE	VOLTAGE	VOLTAGE MIN/MAX	COMPRESSOR				FAN MOTOR FLA	TOTAL UNIT FLA	MIN CIRCUIT AMP	FUSE/ HACR AMP
				MCC	RLA	LRA	Qty				
SD09	A.B.	115-1-60	104/126	12.5	8.0	50.0	1	1.0	9.0	11.0	15
	G.J.	208/230-1-60	187/252	5.8	3.7	22.0	1	0.5	4.2	5.1	15
	E.D.	265-1-60	249/291	5.5	3.5	22.0	1	0.3	3.8	4.7	15
SD12	A.B.	115-1-60	104/126	12.5	8.0	50.0	1	1.0	9.0	11.0	15
	G.J.	208/230-1-60	187/252	6.9	4.4	25.0	1	0.5	4.9	6.0	15
	E.D.	265-1-60	249/291	5.5	3.5	18.7	1	0.4	3.9	4.8	15
SD15	G.J.	208/230-1-60	187/252	8.7	5.6	29.0	1	0.7	6.3	7.7	15
	E.D.	265-1-60	249/291	7.8	5.0	28.0	1	0.7	5.7	6.9	15
SD18	G.J.	208/230-1-60	187/252	20.7	13.3	35.0	1	0.7	14.0	17.3	30
	E.D.	265-1-60	249/291	10.2	6.5	40.0	1	0.7	7.2	8.8	15

Notes:
- All fuses Class RK-5.

PSC with Interal Secondary Pump

Model	VOLTAGE CODE	VOLTAGE	VOLTAGE MIN/MAX	COMPRESSOR				Pump FLA	FAN MOTOR FLA	TOTAL UNIT FLA	MIN CIRCUIT AMP	FUSE/ HACR AMP
				MCC	RLA	LRA	Qty					
SD09	A.B.	115-1-60	104/126	12.5	8.0	50.0	1	0.8	1.0	9.8	11.8	15
	G.J.	208/230-1-60	187/252	5.8	3.7	22.0	1	0.8	0.5	5.0	5.9	15
	E.D.	265-1-60	249/291	5.5	3.5	22.0	1	0.7	0.3	4.5	5.4	15
SD12	A.B.	115-1-60	104/126	12.5	8.0	50.0	1	1.4	1.0	10.4	12.4	15
	G.J.	208/230-1-60	187/252	6.9	4.4	25.0	1	1.1	0.5	6.0	7.1	15
	E.D.	265-1-60	249/291	5.5	3.5	18.7	1	1.3	0.4	5.2	6.1	15
SD15	G.J.	208/230-1-60	187/252	8.7	5.6	29.0	1	1.1	0.7	7.4	8.8	15
	E.D.	265-1-60	249/291	7.8	5.0	28.0	1	1.3	0.7	7.0	8.2	15
SD18	G.J.	208/230-1-60	187/252	20.7	13.3	35.0	1	1.1	0.7	15.1	18.4	30
	E.D.	265-1-60	249/291	10.2	6.5	40.0	1	1.3	0.7	8.5	10.1	15

Notes:
- All fuses Class RK-5.

Electrical Data
CT EC Blower Motor

Models:
SD
09-18

No Interal Secondary Pump

Model	VOLTAGE CODE	VOLTAGE	VOLTAGE MIN/MAX	COMPRESSOR				FAN MOTOR FLA	TOTAL UNIT FLA	MIN CIRCUIT AMP	FUSE/ HACR AMP
				MCC	RLA	LRA	Qty				
SD09	A.B.	115-1-60	104/126	12.5	8.0	50.0	1	3.5	11.5	13.5	20
	G.J.	208/230-1-60	187/252	5.8	3.7	22.0	1	2.3	6.0	6.9	15
	E.D.	265-1-60	249/291	5.5	3.5	22.0	1	2.3	5.8	6.7	15
SD12	A.B.	115-1-60	104/126	12.5	8.0	50.0	1	3.5	11.5	13.5	20
	G.J.	208/230-1-60	187/252	6.9	4.4	25.0	1	2.3	6.7	7.8	15
	E.D.	265-1-60	249/291	5.5	3.5	18.7	1	2.3	5.8	6.7	15
SD15	G.J.	208/230-1-60	187/252	8.7	5.6	29.0	1	2.3	7.9	9.3	15
	E.D.	265-1-60	249/291	7.8	5.0	28.0	1	2.3	7.3	8.6	15
SD18	G.J.	208/230-1-60	187/252	20.7	13.3	35.0	1	2.3	15.6	18.9	30
	E.D.	265-1-60	249/291	10.2	6.5	40.0	1	2.3	8.8	10.4	15

Notes:
- All fuses Class RK-5.

CT EC with Interal Secondary Pump

Model	VOLTAGE CODE	VOLTAGE	VOLTAGE MIN/MAX	COMPRESSOR				Pump FLA	FAN MOTOR FLA	TOTAL UNIT FLA	MIN CIRCUIT AMP	FUSE/ HACR AMP
				MCC	RLA	LRA	Qty					
SD09	A.B.	115-1-60	104/126	12.5	8.0	50.0	1	0.8	3.5	12.3	14.3	20
	G.J.	208/230-1-60	187/252	5.8	3.7	22.0	1	0.8	2.3	6.8	7.7	15
	E.D.	265-1-60	249/291	5.5	3.5	22.0	1	0.7	2.3	6.5	7.4	15
SD12	A.B.	115-1-60	104/126	12.5	8.0	50.0	1	1.4	3.5	12.9	14.9	20
	G.J.	208/230-1-60	187/252	6.9	4.4	25.0	1	1.1	2.3	7.8	8.9	15
	E.D.	265-1-60	249/291	5.5	3.5	18.7	1	1.3	2.3	7.1	8.0	15
SD15	G.J.	208/230-1-60	187/252	8.7	5.6	29.0	1	1.1	2.3	9.0	10.4	15
	E.D.	265-1-60	249/291	7.8	5.0	28.0	1	1.3	2.3	8.6	9.9	15
SD18	G.J.	208/230-1-60	187/252	20.7	13.3	35.0	1	1.1	2.3	16.7	20.0	30
	E.D.	265-1-60	249/291	10.2	6.5	40.0	1	1.3	2.3	10.1	11.7	15

Notes:
- All fuses Class RK-5.

Models:
SD
09-18

Electrical Data: Power Wiring

⚠ WARNING

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

⚠ CAUTION

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

ELECTRICAL

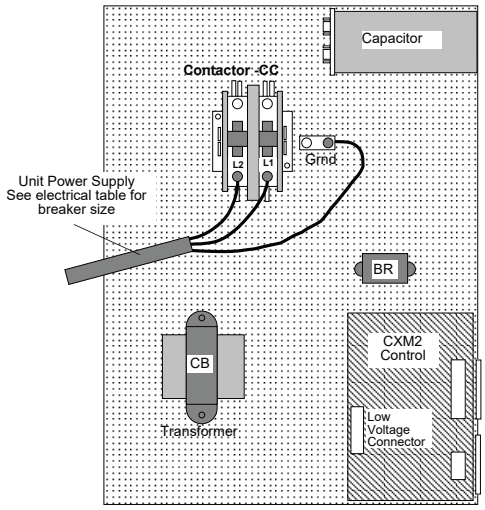
Line Voltage - All field installed wiring, including electrical ground, must comply with NFPA 70: National Electrical Code (NEC), CSA C22.1: Canadian Electrical Code (CE Code), as well as applicable local codes. Refer to the unit electrical data for fuse sizes. Consult wiring diagram for field connections 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.

Disconnects - Units with a factory-installed disconnect switch will provide full separation of all poles and disconnection from main line voltage. For units where factory disconnect is not selected as an option, the installer must incorporate the means to fully disconnect the line voltage in the fixed wiring in accordance with wiring rules and local electrical codes.

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 2: Single Phase Line Voltage Field Wiring



NOTE: 460V units with an EC motor or Internal Secondary Pump require a neutral wire. 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 Figure 2 Consult electrical data tables for maximum fuse size.

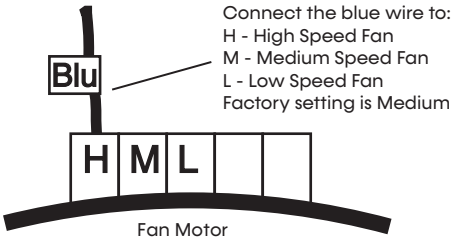
TRANSFORMER

All 208/230V units are factory wired for 208V. If supply voltage is 230V, installer must rewire transformer. See wire diagram for connections.

BLOWER SPEED SELECTION

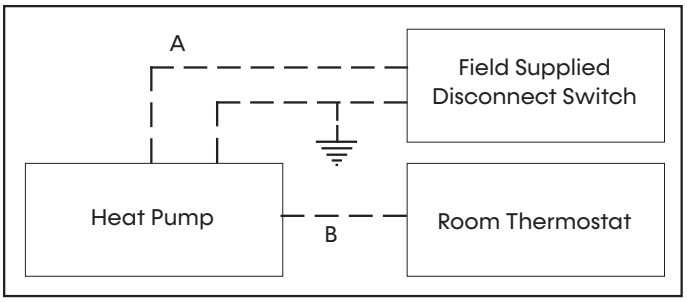
Units with PSC Motor - PSC (Permanent Split Capacitor) blower motor speed can be changed by moving the blue wire on the motor terminal block to the desired speed as shown in Figure 3. Most units are shipped on the medium speed tap. Consult submittal data or engineering design guide for specific unit airflow tables. Typical unit design delivers rated airflow at nominal static (0.15 inch w.g. [37 Pa]) on medium speed and rated airflow at a higher static (0.4 to 0.5 in. w.g. [100 to 125 Pa]) on high speed for applications where higher static is required. Low speed will deliver approximately 85% of rated airflow at 0.10 in. w.g. [25 Pa].

Figure 3: PSC Motor Speed Selection



Electrical Data: Low Voltage Wiring

Models:
SD
09-18



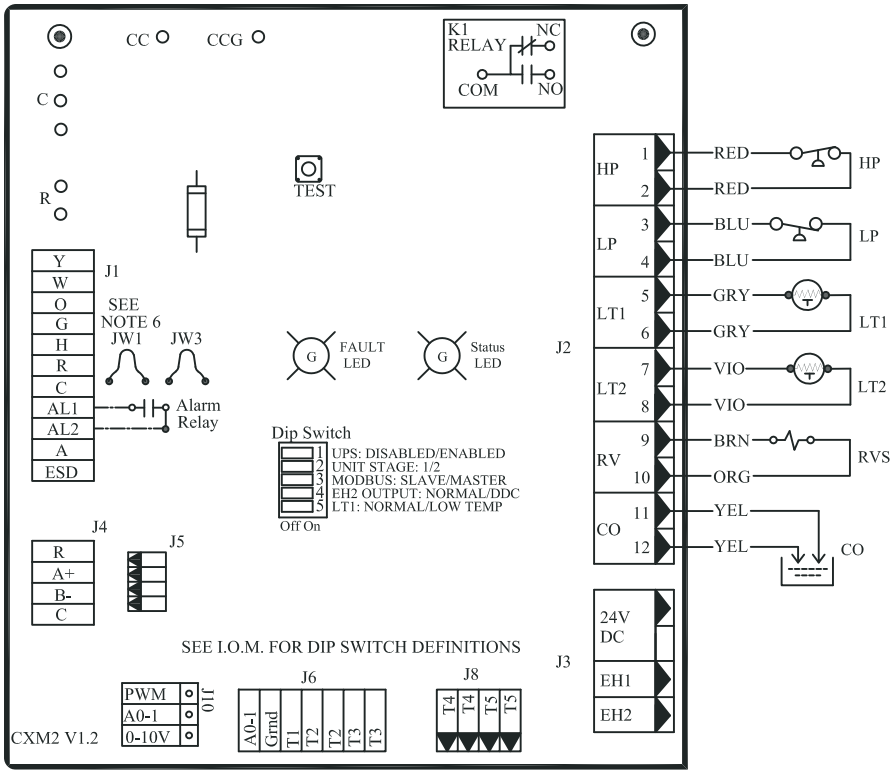
- A = Two power wires on single-phase units: three power wires on three-phase units.
- B = 1 heat /1 cool /manual or Auto Change-over remote 24V thermostat.

NOTE: All customer-supplied wiring to be copper only and must conform to NEC and local electrical codes. Wiring shown with dashed lines must be field-supplied and field-installed. "B" only required with systems employing remote-mounted thermostats.

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 (see Figure 4 below), which changes the sensing temperature associated with thermistor LT1. Note that the LT1 thermistor is located on the refrigerant line between the coaxial heat exchanger and expansion device (TXV). Therefore, LT1 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 LT1 is for systems using water (30°F [-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 4 below to change the setting to 10°F (-12.2°C) refrigerant temperature, a more suitable temperature when using an antifreeze solution. All ClimateMaster units operating with entering water temperatures below 60°F (15.6°C) must include the optional water/ refrigerant circuit insulation package to prevent internal condensation.

Figure 4: LT1 Limit Setting



Models:
SD
09-18

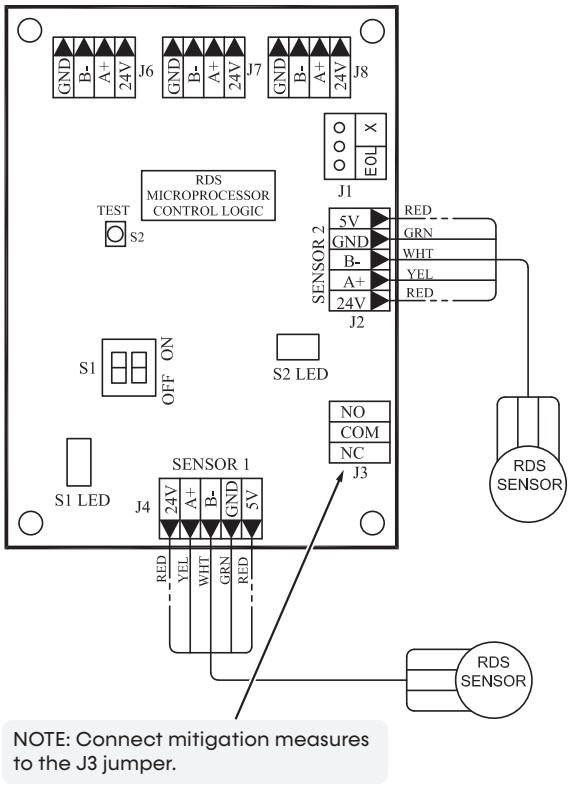
Electrical: Low Voltage Wiring

REFRIGERANT DETECTION SYSTEM (RDS)

The function, operation, and required servicing measures for the Refrigerant Detection System (RDS) include the following:

- The RDS monitors the status of the refrigerant sensor(s) in the unit. If refrigerant is detected above the maximum threshold, the control enables the unit blower, disables the compressor(s), and enables the pilot relay on the RDS control board. You can use this relay to open external zoning dampers and/or activate external mechanical ventilation. The relay is normally closed (NC) and can control a signal with a maximum of 28VA @ 24VAC.
- A fault is enabled if the RDS control board loses communication with a refrigerant sensor or if the main control board loses communication with the RDS board. See Functional Troubleshooting for steps to troubleshoot the RDS.

Figure 5: RDS Board



NOTE: Connect mitigation measures to the J3 jumper.

Electrical: Thermostat Wiring

Models:
SD
09-18

Unit-mounted control models include digital display unit-mounted auto changeover (ACO) control.

Figure 6: CM 100 (ATA32V01)

Figure 7: CM 300 (ATA32V02R)

To Change Mode

Press the Mode button to toggle through heat only, cool only, auto, off. Stop where desired.

To Adjust Setpoint

Press the Up Arrow for temperature increase or down arrow for temperature decrease. Stop where desired.

To Select Fan Operation/Speed

Press the Fan button to toggle through fan on low, fan on hi, fan auto lo, and fan auto hi. Stop where desired. ON is continuous and Auto cycles fan with compressor.

To Configure Thermostat

for temperature reading in Fahrenheit or Celsius and backlight on/off.

Temperature Reading

Press and hold mode button for 3-5 seconds.

The screen flashes U1 with °F or °C below. Press and release. The Mode button °F or °C will flash. Use the Down Arrow to change to °C. Use Up Arrow to change to °F.

Press the Fan button to escape.

Backlight

Press and hold mode button for 3-5 seconds.

The screen flashes U1. Press the Up Arrow and the screen will change to U2 flashing. Press and release the Mode button and On will flash. To disable, press the Down Arrow. Press the Up Arrow to enable.

Press the Fan button to escape.

The thermostat has advanced features to be changed by qualified installer only (do not use code 99- to restore factory default settings, reset each code if needed.)

Models:
SD
09-18

Electrical: Thermostat Wiring

To enter Advanced mode, push and hold the Fan button for 10-15 seconds. Use Mode and Arrow buttons to make selections.

Code 02 is sensor selection: rS is remote (default) - DO NOT CHANGE.

Code 07 is delay: off - time guard enabled (default); on- time guard disabled. - DO NOT CHANGE.

Code 11 is deadband between auto heat and cool: 1 through 10 for °F or °C (5 = default).

Code 15 is auto or manual: On is auto (default); of is manual.

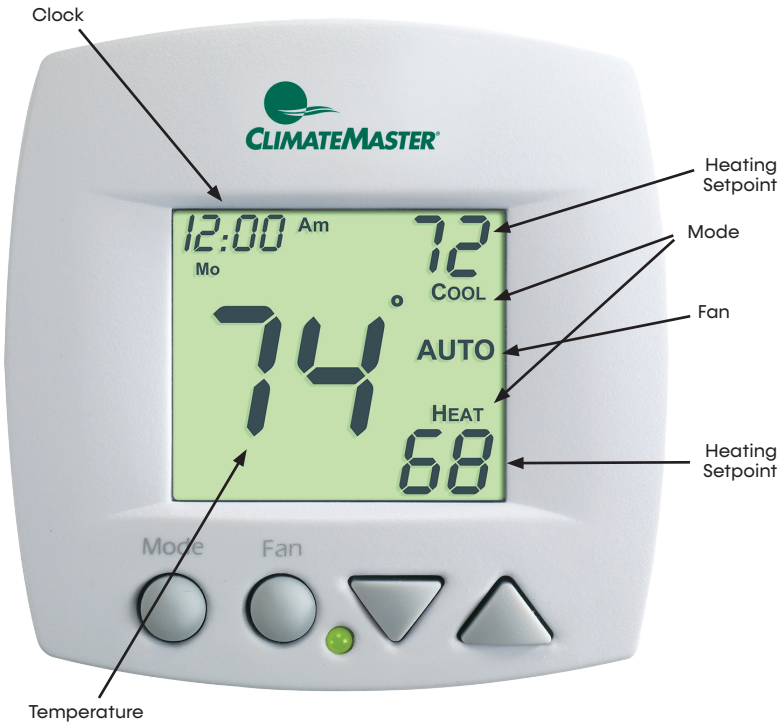
Code 21 is keypad lock: user has full access (default); 1 only access to setpoints; cd entire keypad is locked.

Code 26 is minimum cooling setpoint: 55°F to 90°F (60°F default). [12 °C to 32 °C (50 °C default)]

Code 27 is maximum heating setpoint: 50°F to 90°F (85°F default). [10 °C to 32 °C (29 °C default)]

Thermostat has additional codes - DO NOT CHANGE

Figure 8: CM 100 Display



Electrical: Thermostat Wiring

Models:
SD
09-18

OPTIONAL WALL-MOUNTED THERMOSTAT

Tranquility SD units (Model digit 9 is C or D) are built with standard internal thermostat that has automatic changeover (ACO) configuration. No external, field-installed low-voltage wiring is required.

When desired, the unit can be furnished with a 24V control circuit which is field-wired to a remote thermostat.

Low-voltage wiring between the unit and the wall thermostat must comply with all applicable electrical codes (i.e., NEC and local codes), and be completed before the unit is installed.

Table 5: Recommended Thermostat Wire Sizes

WIRE SIZE	MAX. WIRE LENGTH
22-Gauge	30 Feet
20-Gauge	50 Feet
18-Gauge	75 Feet
16-Gauge	125 Feet
14-Gauge	200 Feet

THERMOSTAT INSTALLATION

The thermostat should be located on an interior wall in a larger room, away from supply air 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-inch (5-mm) 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 7 to the low voltage terminal strip on the CXM2 or DXM2.5 control board. Practically any heat-pump thermostat will work with console units, provided it has the correct number of heating and cooling stages.

Zone integrity must be maintained to efficiently control units or groups of units. Unless zones of control are considered and accounted for, adjacent units may operate in heating and cooling modes simultaneously. To prevent this problem, multiple units configured with the DXM2.5 controller can be controlled by one thermostat as shown in Figure 7a.

Figure 9: Units with PSC and CT EC Blower Motors

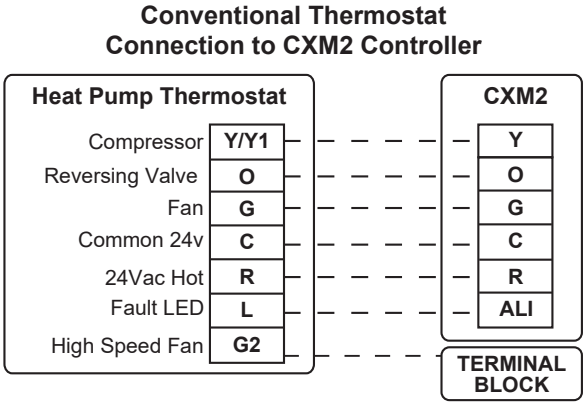
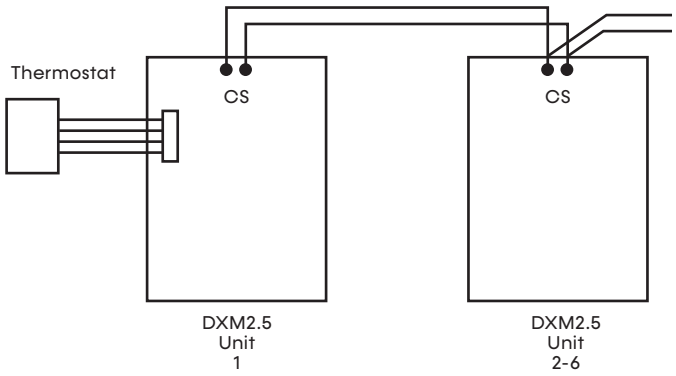


Figure 10: Wiring for Multiple Units to be Controlled from One Thermostat



Connect thermostat to Unit 1 then jumper Com 1 (S to S and C to C) up to six units with twisted pair.

Models:
SD
09-18

Blower Performance

PSC Blower Performance

Model	Rated Airflow CFM	SCFM		
		Low Speed	Medium Speed	High Speed
SD09	350	270	310	350
SD12	450	290	360	450
SD15	520	360	440	520
SD18	620	400	500	620

- Blower performance data is based on the lowest nameplate voltage setting.
- Blower performance is based on a wet coil with clean 1-inch filter.
- Blower performance is based on operating conditions of 80°F DB and 67°F WB.
- CFM Tolerance is ±7%
- Cells in grey - option not available

CT EC Blower Performance

Model	Rated Airflow CFM	SCFM			
		TAP1	TAP2	TAP3	TAP4
SD09	350	280	300	330	350
SD12	450	290	310	360	450
SD15	520	360	410	470	520
SD18	620	400	450	550	620

- Blower performance data is based on the lowest nameplate voltage setting.
- Blower performance is based on a wet coil with clean 1-inch filter.
- Blower performance is based on operating conditions of 80°F DB and 67°F WB.
- CFM Tolerance is ±7%
- Cells in grey - option not available

Controls: CXM2

Models:
SD
09-18

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.

Models:
SD
09-18

Operating Limits and Commissioning Conditions

OPERATING LIMITS

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

Power Supply – Voltage utilization shall comply with AHRI Standard 110 or values provided in the electrical data tables.

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.

COMMISSIONING CONDITIONS

Starting conditions vary depending upon model and are based upon the following notes:

NOTES:

1. Commissioning Conditions are not normal or continuous operating conditions. Minimum/maximum limits are startup 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 6: Operating Limits

Operating Limits	Cooling	Heating
Air Limits		
Min. ambient air, DB	*10°F [-12°C]	*10°F [-12°C]
Max. ambient air, DB	130°F [54.4°C]	130°F [54.4°C]
Min. entering air, DB/WB	65/45°F [18/7°C]	50°F [10°C]
Max. entering air, DB/WB	90/72°F [32/22°C]	80°F [27°C]
Min/Max Airflow (CFM/Ton)	**300 to 500 CFM/Ton	
Water Limits		
Min. entering water	***30°F [-1°C]	20°F [-6.7°C]
Max. entering water	120°F [49°C]	90°F [32°C]
Water Flow Range	1.5 to 3.0 GPM/Ton [1.6 to 3.2 l/m per kW]****	

Notes:
*To prevent unit damage, the water loop should contain antifreeze to prevent freezing when not in operation.
** Refer to specific blower tables for each model size
***With unit flow-control automation.
**** Unless specified different on performance table for any model size

Table 7: Commissioning Conditions

Commissioning Conditions	Cooling	Heating
Air Limits		
Min. ambient air, DB	*10°F [-12°C]	*10°F [-12°C]
Max. ambient air, DB	130°F [54.4°C]	130°F [54.4°C]
Min. entering air, DB/WB	65/45°F [18/7°C]	[2]40°F [4.4°C]
Max. entering air, DB/WB	[1]100/75°F [38/24°C]	80°F [27°C]
Min/Max Airflow (CFM/Ton)	**300 to 500 CFM/Ton	
Water Limits		
Min. entering water	***20°F [-6.7°C]	20°F [-6.7°C]
Max. entering water	120°F [49°C]	90°F [32°C]
Water Flow Range	1.5 to 3.0 GPM/Ton [1.6 to 3.2 l/m per kW]****	

Notes:
*To prevent unit damage, the water loop should contain antifreeze to prevent freezing when not in operation.
** Refer to specific blower tables for each model size
***With unit flow-control automation.
**** Unless specified different on performance table for any model size
1. Commission units for cooling at entering air temperatures of 100/75°F [38/24°C] only at rated water flow or 3 GPM/Ton.
2. Commission units for heating at entering air temperature of 40°F [4.4°C] only at rated water flow or 3 GPM/Ton.

Unit Maximum Water Working Pressure

Options	Max Pressure PSIG [kPa]
Base Unit	300 [2,068]
Internal Secondary Pump (ISP)	145 [999]
Internal Motorized Water Valve (MWV)	300 [2,068]
Internal Auto Flow Valve	300 [2,068]

Use the lowest maximum pressure rating when multiple options are combined.

Piping System: Cleaning and Flushing

Models:
SD
09-18

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.
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 85°F [29°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 one pound per 150 gallons (0.8 kg per 1000 l) of water (or other equivalent approved cleaning agent). Reset the boiler to raise the loop temperature to 100°F [38°C]. Circulate the solution for a minimum of 8 to 24 hours. At the end of this period, shut off the circulating pump and drain the solution. Repeat system cleaning if desired.
8. When the cleaning process is complete, remove the short-circuited hoses. Reconnect the hoses to the proper supply, and return the connections to each of the units. Refill the system and bleed off all air.
9. Test the system pH with litmus paper. The system water should be in the range of pH 6.0 - 8.5 (see the Water Quality Requirements Table). 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.

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.

Models:
SD
09-18

Unit and System Checkout

UNIT AND SYSTEM CHECKOUT

BEFORE POWERING SYSTEM, please check the following:

UNIT FEATURES

- ☐ **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 7 and Table 8.
- ☐ **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 startup. 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 set points for proper operation.
- ☐ **System pH:** Check and adjust water pH if necessary to maintain a level between 6 and 8.5. Proper pH promotes longevity of hoses and fittings (see Table 4).
- ☐ **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

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

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 Startup Procedure

Models:
SD
09-18

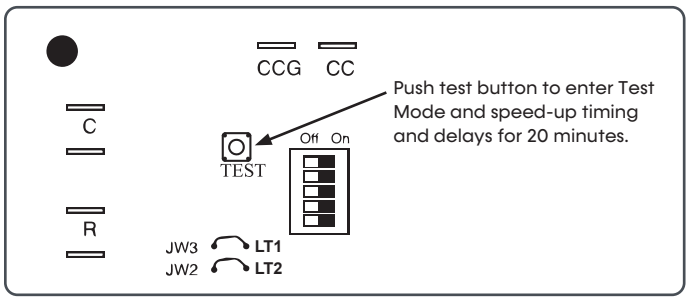
UNIT STARTUP PROCEDURE

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 8. During startup checks, loop water temperature entering the heat pump should be between 60°F (16°C) and 95°F (35°C).
5. Two factors determine the operating limits of SD 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 8. See controls description for details.
   c. 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.
   d. Refer to Table 9. Check the temperature of both entering and leaving water. If temperature is within range, proceed with the test. If temperature is outside of the operating range, check refrigerant pressures.
   e. Check air temperature drop across the air coil when compressor is operating. Air temperature drop should be between 15°F and 25°F (8°C and 14°C).
   f. 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 9. Check the temperature of both entering and leaving water. If temperature is within range, proceed with the test. If temperature is outside of the operating range, check refrigerant pressures.
   e. Check air temperature rise across the air coil when compressor is operating. Air temperature rise should be between 20°F and 30°F (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.

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 startup. A 10% solution of dishwasher detergent and water is recommended.

Figure 11: Test Mode Button



Models:
SD
09-18

Unit Operating Conditions

Operating Pressure/Temperature tables include the following notes:

- Airflow is at nominal (rated) conditions
- Entering air is based upon 70°F (21°C) DB in heating and 80/67°F (27/19°C) in cooling
- Subcooling is based upon head pressure at compressor service port
- Cooling air and water values can vary greatly with changes in humidity level

Table 8: SD Series Typical Unit Operating Pressures and Temperatures

SD09		Full Load Cooling						Full Load Heating					
Entering Water Temp °F	Water Flow GPM/ Ton	Suction Pressure PSIG	Discharge Pressure PSIG	Super-heat	Sub-cooling	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Super-heat	Sub-cooling	Water Temp Drop °F	Air Temp Rise °F DB
30	1.4	126-136	161-181	17-22	8-13	19.8-21.8	21-27	74-84	278-298	6-11	4-9	6.1-8.1	18-24
	2	126-136	146-166	17-22	7-12	14.9-16.9	21-27	77-87	280-300	6-11	4-9	4.5-6.5	18-24
	2.75	126-136	131-151	17-22	6-11	9.9-11.9	21-27	79-89	283-303	6-11	3-8	2.8-4.8	19-25
50	1.4	132-142	215-235	10-15	8-13	18.8-20.8	20-26	104-114	309-329	8-12	7-12	9.6-11.6	24-30
	2	132-142	200-220	10-15	7-12	14.4-16.1	20-26	106-116	312-332	8-12	7-12	7-9	24-30
	2.75	132-142	185-205	10-15	6-11	9.4-11.4	20-26	108-118	315-335	8-12	7-12	4.5-6.5	25-31
70	1.4	138-148	278-298	8-13	9-14	17.7-19.7	19-25	127-137	332-352	10-15	10-15	12-14	29-35
	2	138-148	263-283	8-13	8-13	13.1-15.1	19-25	132-142	340-360	11-16	10-15	9-10	29-35
	2.75	137-147	248-268	8-13	7-12	8.5-10.5	19-25	138-148	341-367	13-18	10-15	6.1-8.1	30-36
90	1.4	142-152	365-385	8-13	9-14	16-18	18-24	164-174	372-392	17-22	13-18	14.5-16.5	35-41
	2	142-152	351-371	8-13	8-13	12-14	18-24	165-175	375-395	18-23	13-18	11.2-13.2	35-41
	2.75	142-152	337-357	8-13	7-12	8-10	18-24	167-177	379-399	19-24	13-18	7.9-9.9	36-42
110	1.4	150-160	439-459	7-12	9-14	14.2-16.2	17-23						
	2	150-160	439-459	7-12	8-13	10.6-12.6	17-23						
	2.75	150-160	439-459	7-12	7-12	6.9-8.9	17-23						

*Based on 20% Methanol antifreeze solution

SD12		Full Load Cooling						Full Load Heating					
Entering Water Temp °F	Water Flow GPM/ Ton	Suction Pressure PSIG	Discharge Pressure PSIG	Super-heat	Sub-cooling	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Super-heat	Sub-cooling	Water Temp Drop °F	Air Temp Rise °F DB
30	1.75	98-108	140-160	36-41	14-19	17.1-19.1	19-25	72-82	301-321	9-14	12-17	6.5-8.5	21-27
	2.6	98-108	135-155	36-41	12-17	12.5-14.5	19-25	85-95	304-324	9-14	12-17	4.7-6.7	21-27
	3.5	99-109	127-148	36-41	10-15	7.9-9.9	19-25	78-88	308-328	9-14	12-17	2.9-4.9	22-28
50	1.75	118-128	215-235	22-27	14-19	18.1-20.1	20-26	100-110	337-357	10-15	15-20	9.5-11.5	26-32
	2.6	118-128	200-220	22-27	12-17	13.1-15.1	20-26	98-108	334-354	10-15	15-20	6.6-8.6	26-32
	3.5	118-128	185-205	22-27	10-15	8.1-10.1	19-25	95-105	332-352	11-16	15-20	3.8-5.8	26-32
70	1.75	132-142	300-320	11-16	12-17	17-19	19-25	115-125	361-381	19-24	18-23	11.1-13.1	29-35
	2.6	132-142	263-282	11-16	10-15	12.6-14.6	19-25	112-122	360-380	20-25	18-23	8-10	29-35
	3.5	132-142	245-265	12-17	7-12	8.2-10.2	19-25	110-120	356-376	21-26	18-23	4.8-6.8	29-35
90	1.75	138-148	366-386	9-14	11-16	15.8-17.8	18-24	122-132	376-396	34-39	22-27	12.1-14.1	32-38
	2.6	138-148	353-373	9-14	9-14	14.9-16.9	18-24	123-133	378-398	36-41	22-27	9-11	32-38
	3.5	138-148	340-360	9-14	6-11	14-16	18-24	124-134	380-400	38-43	23-28	5.8-7.8	32-38
110	1.75	145-155	453-473	9-14	9-14	14.7-16.7	16-22						
	2.6	145-155	442-462	9-14	7-12	10.8-12.8	16-22						
	3.5	145-155	431-451	9-14	5-10	6.8-8.8	17-23						

*Based on 20% Methanol antifreeze solution

Unit Operating Conditions

Models:
SD
09-18

SD15		Full Load Cooling						Full Load Heating					
Entering Water Temp °F	Water Flow GPM/ Ton	Suction Pressure PSIG	Discharge Pressure PSIG	Super-heat	Sub-cooling	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Super-heat	Sub-cooling	Water Temp Drop °F	Air Temp Rise °F DB
30	2.1	98-108	140-160	36-41	14-19	17.1-19.1	19-25	74-84	278-298	6-11	4-9	6.1-8.1	18-24
	3.15	98-108	135-155	36-41	12-17	12.5-14.5	19-25	77-87	280-300	6-11	4-9	4.5-6.5	18-24
	4.2	99-109	127-148	36-41	10-15	7.9-9.9	19-25	79-89	283-303	6-11	3-8	2.8-4.8	19-25
50	2.1	118-128	215-235	22-27	14-19	18.1-20.1	20-26	104-114	309-329	8-12	7-12	9.6-11.6	24-30
	3.15	118-128	200-220	22-27	12-17	13.1-15.1	20-26	106-116	312-332	8-12	7-12	7-9	24-30
	4.2	118-128	185-205	22-27	10-15	8.1-10.1	19-25	108-118	315-335	8-12	7-12	4.5-6.5	25-31
70	2.1	132-142	300-320	11-16	12-17	17-19	19-25	127-137	332-352	10-15	10-15	12-14	29-35
	3.15	132-142	263-282	11-16	10-15	12.6-14.6	19-25	132-142	340-360	11-16	10-15	9-10	29-35
	4.2	132-142	245-265	12-17	7-12	8.2-10.2	19-25	138-148	347-367	13-18	10-15	6.1-8.1	30-36
90	2.1	138-148	366-386	9-14	11-16	15.8-17.8	18-24	164-174	372-392	17-22	13-18	14.5-16.5	35-41
	3.15	138-148	353-373	9-14	9-14	14.9-16.9	18-24	165-175	375-395	18-23	13-18	11.2-13.2	35-41
	4.2	138-148	340-360	9-14	6-11	14-16	18-24	167-177	379-399	19-24	13-18	7.9-9.9	36-42
110	2.1	145-155	453-473	9-14	9-14	14.7-16.7	16-22						
	3.15	145-155	442-462	9-14	7-12	10.8-12.8	16-22						
	4.2	145-155	431-451	9-14	5-10	6.8-8.8	17-23						

*Based on 20% Methanol antifreeze solution

SD18		Full Load Cooling						Full Load Heating					
Entering Water Temp °F	Water Flow GPM/ Ton	Suction Pressure PSIG	Discharge Pressure PSIG	Super-heat	Sub-cooling	Water Temp Rise °F	Air Temp Drop °F DB	Suction Pressure PSIG	Discharge Pressure PSIG	Super-heat	Sub-cooling	Water Temp Drop °F	Air Temp Rise °F DB
30	2.5	98-108	140-160	36-41	14-19	17.1-19.1	19-25	74-84	278-298	6-11	4-9	6.1-8.1	18-24
	3.75	98-108	135-155	36-41	12-17	12.5-14.5	19-25	77-87	280-300	6-11	4-9	4.5-6.5	18-24
	5	99-109	127-148	36-41	10-15	7.9-9.9	19-25	79-89	283-303	6-11	3-8	2.8-4.8	19-25
50	2.5	118-128	215-235	22-27	14-19	18.1-20.1	20-26	104-114	309-329	8-12	7-12	9.6-11.6	24-30
	3.75	118-128	200-220	22-27	12-17	13.1-15.1	20-26	106-116	312-332	8-12	7-12	7-9	24-30
	5	118-128	185-205	22-27	10-15	8.1-10.1	19-25	108-118	315-335	8-12	7-12	4.5-6.5	25-31
70	2.5	132-142	300-320	11-16	12-17	17-19	19-25	127-137	332-352	10-15	10-15	12-14	29-35
	3.75	132-142	263-282	11-16	10-15	12.6-14.6	19-25	132-142	340-360	11-16	10-15	9-10	29-35
	5	132-142	245-265	12-17	7-12	8.2-10.2	19-25	138-148	347-367	13-18	10-15	6.1-8.1	30-36
90	2.5	138-148	366-386	9-14	11-16	15.8-17.8	18-24	164-174	372-392	17-22	13-18	14.5-16.5	35-41
	3.75	138-148	353-373	9-14	9-14	14.9-16.9	18-24	165-175	375-395	18-23	13-18	11.2-13.2	35-41
	5	138-148	340-360	9-14	6-11	14-16	18-24	167-177	379-399	19-24	13-18	7.9-9.9	36-42
110	2.5	145-155	453-473	9-14	9-14	14.7-16.7	16-22						
	3.75	145-155	442-462	9-14	7-12	10.8-12.8	16-22						
	5	145-155	431-451	9-14	5-10	6.8-8.8	17-23						

*Based on 20% Methanol antifreeze solution

Models:
SD
09-18

Unit Operating Conditions

Table 9: Coax Water Pressure Drop

Model	GPM	Pressure Drop, PSI				PD Added for Motorized Water Valve
		30°F	50°F	70°F	90°F	
SD09	1.1	1.6	1.2	1.0	0.9	0.3
	1.6	2.6	2.2	2.0	1.9	0.6
	2.3	4.5	3.8	3.5	3	1.2
SD12	1.5	2.1	1.8	1.5	1.3	0.5
	2.3	4.5	3.8	3.5	3	1.2
	3	6.8	5.8	4.9	4.5	2.2
SD15	1.9	1.5	1	0.9	0.8	0.7
	2.8	3	2.3	2	1.7	1.7
	3.7	4.7	3.9	3.3	2.9	3.3
SD18	2.3	2.2	1.8	1.5	1.3	0.2
	3.4	4.4	3.8	3.4	3	0.6
	4.5	6.9	6	5.2	4.8	1.1

Startup Log Sheet

Models:
SD
09-18

7300 S.W. 44th Street, Oklahoma City, OK 73179 • Phone: 1-800-299-9747

Installer: Complete *Unit and System Checkout* and follow *Unit Startup Procedures* in the IOM. Use this form to record unit information, temperatures, and pressures during startup. Keep this form for reference.

Job Name:

Street Address:

Model Number: **Serial Number:**

Unit Location in Building:

Date: **Sales Order Number:**

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

Temperatures (check one): ☐ °F ☐ °C Antifreeze: _____ %

Pressures (check one): ☐ PSIG ☐ kPa Type: _____

	Cooling Mode	Heating Mode
Entering Fluid Temperature		
Leaving Fluid Temperature		
Fluid Temperature Differential		
Return-Air Temperature	DB	DB
Supply-Air Temperature	DB	DB
Air Temperature Differential		
Water Coil Heat Exchanger (Water Pressure IN)		
Water Coil Heat Exchanger (Water Pressure OUT)		
Pressure Differential		
Flow Rate GPM (l/s)		
Supply Voltage at Contactor		
Transformer Low Side Volts		
Compressor Amps		
Motor Amps		

NOTES:
1. Allow unit to run 15 minutes in each mode before taking data.
2. Never connect refrigerant gauges during startup procedures.
3. Conduct water-side analysis using P/T ports to determine water flow and temperature difference.
4. If water-side analysis shows poor performance, refrigerant troubleshooting may be required.
5. Connect refrigerant gauges as a last resort.

Models:
SD
09-18

Preventative Maintenance

WATER COIL MAINTENANCE (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 GPM per ton (3.9 l/m per kW) can produce water (or debris) velocities that can erode the heat exchanger wall and ultimately produce leaks.

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.

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 ensure 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 ensure that amp draw is no more than 10% greater than indicated on the serial dataplate.

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 and may cause injury.

CABINET

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

REPAIRS TO SEALED COMPONENTS

Sealed electrical components shall be replaced.

Functional Troubleshooting

Models:
SD
09-18

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 airflow in heating	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
				Dirty Air Coil - construction dust etc.
				Too high of external static? Check static vs blower table.
	X		Air temperature out of range in heating	Bring return air temp within design parameters.
	X	X	Overcharged with refrigerant	Check superheat/subcooling vs typical operating condition table.
	X	X	Bad HP Switch	Check switch continuity and operation. Replace.
LP/LOC Fault Code 3 Low Pressure / Loss of Charge	X	X	Insufficient charge	Check for refrigerant leaks.
	X		Compressor pump down at startup	Check charge and startup 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 airflow in cooling	Check for dirty air filter and clean or replace.
				Check fan motor operation and airflow restrictions.
				Too high of external static? Check static vs blower table.
		X	Air Temperature out of range	Too much cold vent air? Bring entering air 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 Airflow	Find and eliminate restriction. Increase return duct and/or grille size.

Table continued on next page.

Models:
SD
09-18

Functional Troubleshooting

Table continued from previous page.

Fault	Htg	Clg	Possible Cause	Solution
Over/Under Voltage Code 7 (Auto resetting)	X	X	Under Voltage	Check power supply and 24VAC voltage before and during operation.
				Check power supply wire size.
				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 LT2>125°F [52°C]	Check for poor airflow or overcharged unit.
		X	Cooling Mode LT1>125°F [52°C] OR LT2< 40°F [4°C])	Check for poor water flow or airflow.
Swapped Thermistor Code 9	X	X	LT1 and LT2 swapped	Reverse position of thermistors
Low Water Flow Code 13	X	X	Reduced or no water flow	Check pump or valve operation setting.
				Check water flow and adjust to proper flow rate.
				Clogged Y strainer, replace mesh.
	X		Inadequate antifreeze level	Check antifreeze density with hydrometer.
	X	X	Bad flow switch	Confirm applied flow to looks vs minimum flow siwtch setpoint on label.
Leaving Water Temperature Low Code 14	X		Reduced or no water flow in heating	Check pump or valve operation setting.
				Check water flow and adjust to proper flow rate.
	X		Inadequate antifreeze level	Check antifreeze density with hydrometer.
	X		Improper temperature limit setting (30°F vs 15°F [-1°C vs -9°C]	Clip JW3 jumper for antifreeze (15°F [-9°C]) use.
	X		Water temperature out of range	Bring water temperature within design parameters.
	X	X	Bad thermistor	Check temperature impedence correlation per chart.
Refrigerant and RDS Code 15	X	X	Refrigerant Leak	Check refrigerant charge. If the charge is low, identify and repair the leak.
			Faulty RDS sensor	Check refrigerant charge. If the charge is not low, replace the RDS sensor.
No Fault Code Shown	X	X	No compressor operation	See "Only Fan Runs".
	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 30 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.

Table continued from previous page.

Fault	Htg	Clg	Possible Cause	Solution
Only Compressor Runs	X	X	Thermostat wiring	Check G wiring at heat pump. Jumper G and R for fan operation.
	X	X		Check thermostat wiring at heat pump. Jumper Y and R for compressor operation in test mode.
	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.
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.
		X		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		Put thermostat in cooling mode. Check 24VAC on O (check between C and O); check for 24VAC 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.

Models:
SD
09-18

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 cooling load and heat pump capacity.
	X	X	Scaling in water heat exchanger	Perform scaling check and clean if necessary.
	X	X	Inlet water too hot or 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 airflow 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 airflow restrictions.
				Too high of external static? Check static vs. blower table.
		X	Air temperature out of range	Too much cold vent air? Bring entering air temperature within design parameters.
	X	X	Insufficient charge	Check for refrigerant leaks.
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'

Table continued on next page.

Performance Troubleshooting

Models:
SD
09-18

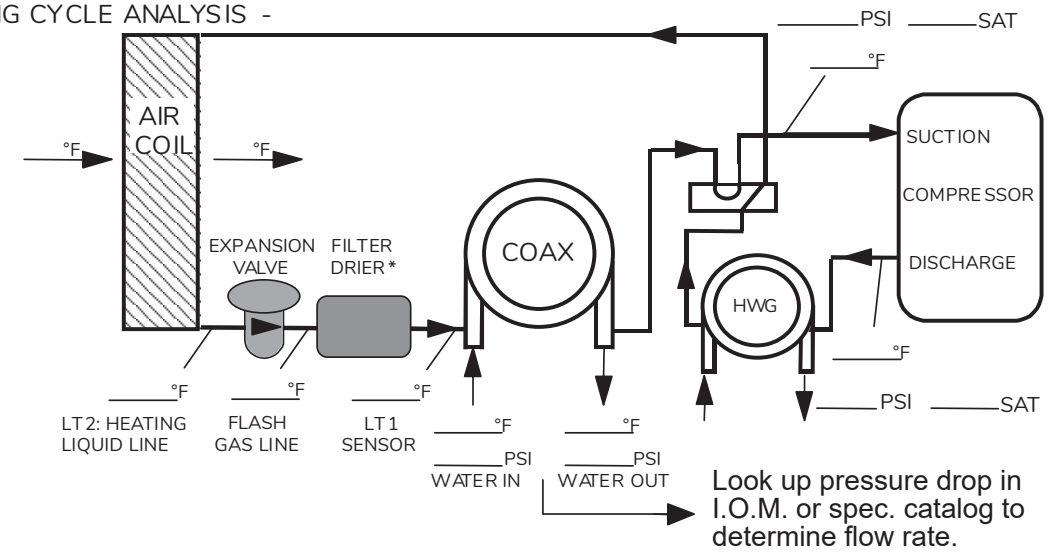
Table continued from previous page.

Symptom	Htg	Clg	Possible Cause	Solution
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.
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 blower relay contacts.
				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 CXM2. Put in Test Mode and then jumper Y1 and W1 to R to give call for fan, compressor and electric heat.
Unit Doesn't Operate in Cooling		X	Reversing valve	Set for cooling demand and check 24VAC on RV coil.
				If RV is stuck, run high pressure up by reducing water flow and, while operating, engage and disengage RV coil voltage to push valve.
		X	Thermostat setup	For DXM2.5, check for "O' RV setup, not "B".
		X	Thermostat wiring	Check O wiring at heat pump. CXM2 requires call for compressor. You should hear a "click" sound from the reversing valve..
Modulating Valve Troubleshooting	X	X	Improper output setting	Verify the AO-2 jumper is in the 0-10V position.
	X	X	No valve output signal	Check DC voltage between AO2 and GND. Should be O when valve is off and between 3.3V and 10V when valve is on.
	X	X	No valve operation	Check voltage to the valve.
				Replace valve if voltage and control signals are present at the valve and it does not operate.

Models:
SD
09-18

Functional Troubleshooting Form

HEATING CYCLE ANALYSIS -



COOLING CYCLE ANALYSIS -

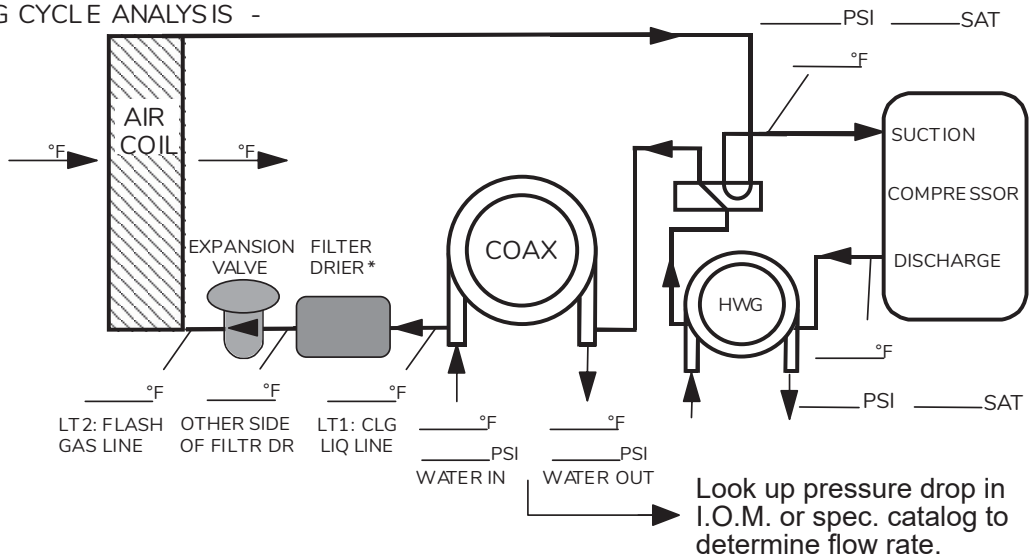
Refrigerant Type:

R-454B

Voltage: _____

Comp Amps: _____

Total Amps: _____



Heat of Extraction (Absorption) or Heat of Rejection =

_____ flow rate (gpm) x _____ temp.diff. (deg. F) x _____ fluid factor† = _____ (Btu/hr)

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

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

† Use 500 for water, 485 for antifreeze.

Rev. 3/24

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.

CLIMATEMASTER
A NIBE GROUP MEMBER

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

It is expressly understood that unless a statement is specifically identified as a warranty, statements made by Climate Master, Inc., a Delaware corporation, ("CM") or its representatives, relating to CM's products, whether oral, written or contained in any sales literature, catalog or any other agreement, are not express warranties and do not form a part of the basis of the bargain, but are merely CM's opinion or commendation of CM's products.

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

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

This warranty does not cover and does not apply to: (1) Air filters, fuses, refrigerant, fluids, oil; (2) Products relocated after initial installation; (3) Any portion or component of any system that is not supplied by CM, regardless of the cause of the failure of such portion or component; (4) Products on which the unit identification tags or labels have been removed or defaced; (5) Products on which payment to CM is or has been in default; (6) Products which have defects or damage which result from improper installation, wiring, electrical imbalance characteristics or maintenance; or are caused by accident, misuse or abuse, fire, flood, alteration or misapplication of the product; (7) Products which have defects or damage which result from a contaminated or corrosive air or liquid supply, operation at abnormal temperatures, or unauthorized opening of refrigerant circuit; (8) Mold, fungus or bacteria damages; (9) Products subjected to corrosion or abrasion; (10) Products manufactured or supplied by others; (11) Products which have been subjected to misuse, negligence or accidents; (12) Products which have been operated in a manner contrary to CM's printed instructions; or (13) Products which have defects, damage or insufficient performance as a result of insufficient or incorrect system design or the improper application of CM's products.

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

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

LIMITATION OF REMEDIES
In the event of a breach of the Limited Express Warranty, CM will only be obligated at CM's option to repair the failed part or unit or to furnish a new or rebuilt part or unit in exchange for the part or unit which has failed. If after written notice to CM's factory in Oklahoma City, Oklahoma of each defect, malfunction or other failure and a reasonable number of attempts by CM to correct the defect, malfunction or other failure and the remedy fails of its essential purpose, CM shall refund the purchase price paid to CM in exchange for the return of the sold good(s). Said refund shall be the maximum liability of CM. **THIS REMEDY IS THE SOLE AND EXCLUSIVE REMEDY OF THE BUYER OR THEIR PURCHASER AGAINST CM FOR BREACH OF CONTRACT, FOR THE BREACH OF ANY WARRANTY OR FOR CM'S NEGLIGENCE OR IN STRICT LIABILITY.**

LIMITATION OF LIABILITY
CM shall have no liability for any damages if CM's performance is delayed for any reason or is prevented to any extent by any event such as, but not limited to: any war, civil unrest, government restrictions or restraints, strikes or work stoppages, fire, flood, accident, shortages of transportation, fuel, material, or labor, acts of God or any other reason beyond the sole control of CM. **CM EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGE IN CONTRACT, FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY, OR IN TORT, WHETHER FOR CM's NEGLIGENCE OR AS STRICT LIABILITY.**

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

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

NOTE: Some states or Canadian provinces do not allow limitations on how long an implied warranty lasts, or the limitation or exclusions of consequential or incidental damages, so the foregoing exclusions and limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state and from Canadian province to Canadian province.

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

Rev.: 11/09

LC083

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

A NIBE GROUP MEMBER

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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

Notes

Models:
SD
09-18

Revision History

Date	Section	Description
08/21/24	Attentions, Cautions, and Warnings;	Added a notice that addresses powering off the unit while the RDS is active
	Operating and Commissioning Limits	Updated Unit Maximum Water Working Pressure
05/14/24	All	Created

CLIMATEMASTER®
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7300 SW 44th St. | Oklahoma City, OK 73179
Phone: 800.299.9747
www.climatemaster.com

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