CCT-DX Series

Precision Air Conditioning Installation, Start-up Operation and Maintenance Procedures Manual

CCT - ( ) A/W/G/PC

[redacted]

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AIRFLOW COMPANY

A Member of Marduk Holding Corp.

CCT-DX Series Air Conditioning

Precision Air Conditioning Installation, Start-up, Operation and Maintenance Procedures Manual

Important Notice
Read Before Installation

Congratulations - You have purchased another quality product from Airflow Company. Everything has been done to make it perfect!

However, should you find a quality problem during start-up that you feel may require compensation, a **repair authorization number** must be obtained from Airflow Company **in advance**.

Call the Service Department, (301) 695-6500 to obtain your repair authorization number. We are available 24 hours a day, 365 days years.

NO CLAIMS WILL BE HONORED WITHOUT A REPAIR AUTHORIZATION NUMBER

Due to an ongoing program dedicated to product improvement, specifications are subject to revision without notice. Airflow Company assumes no responsibility, and disclaims all liability for damages resulting from use of this information or for any errors or omissions.

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Installation

The CCT system has been designed to provide reliable, accurate temperature and humidity control of computer rooms, laboratories, and other environments requiring close tolerance control. The unit incorporated the latest system design innovations to provide you with optimum efficiency, reliability, and control accuracy.

The CCT System will provide years of trouble free service, provided it is installed and maintained by technically qualified personnel.

Computer Room Preparation

During the design of the computer room, consideration should be given to the following factors: ease of entry for the CCT system, floor loading factors and accessibility of piping and wiring.

The room must be sealed with a vapor barrier to minimize moisture infiltration. Polyethylene film (plastic sheeting) is a good vapor barrier for ceiling and wall applications. Rubber or plastic-based paints should be applied to concrete floors and walls.

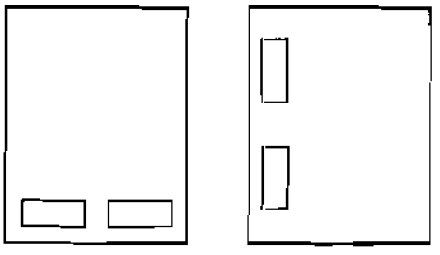
The room should be thoroughly insulated to minimize thermal loads and make-up air should be kept to a minimum to reduce additional temperature, filtration and moisture loads.

A computer room using a raised floor plenum for air distribution should have at least 12 inches of clear space between the false floor and sub-floor for air conditioners below 15 ton capacities. Pay special attention to the location of pipe chases, electrical conduits and other underfloor obstructions. These objects can block air circulation and increase air pressure drops thus reducing system efficiency and causing possible hot spots in your data processing room. Minimum clear space for larger rooms should be 18 inches when air conditioners of 15 tons capacity and larger are utilized.

Airflow Company should be notified ***before installation*** *if the unit is incorrect for the application.*

Unit Location

Unit location is important for efficient and even environmental control in your data center. The air conditioners should be located as close to the largest heat load as possible. Units should be mounted along the longest walls (in rooms having a high aspect ratio) to ensure even air distribution. Erratic control or mechanical failure can and will result if the unit does not obtain proper air volume and distribution due to improper installation.



Incorrect Correct

Service Access

At least 30 inches of clear floor space must be left in front of the unit. It is desirable to have 24 1/2" of clear floor space on each side, but is only required at the location of the mechanical section,.

Receiving The Unit

Your CCT unit has been completely tested and inspected prior to shipment from Airflow Company. To ensure that you have received the unit in excellent condition, perform a careful inspection of the crating and the unit *immediately* upon receipt. Verify that all parts ordered were received as specified and that the unit is the correct size and voltage necessary to fulfill your environmental control needs. Report any apparent or concealed damage discovered to the *freight carrier for insurance purposes.* If necessary, contact Airflow Company's field service department for aid in repairing or replacing damaged parts. While Airflow Company is not responsible for exterior or interior damages incurred in transit, we want to make sure that you have no undue delays in your system start-up.

Rigging

The CCT air conditioner is manufactured with a welded angle-steel frame for maximum strength and unit integrity. However, as with all electrical/mechanical equipment, care must be taken in proper rigging of your CCT unit. If you uncrate the unite before moving it into place, we suggest that the panels be removed to prevent damage during handling.

When using a fork lift to move the CCT unit, use the shipping skid to protect the bottom of the unit.

When using chains, cable or rope to lift the unit, use spreader bars to prevent damage to the finished panels.

Every unit has sockets in the bottom corners sized to accept casters with 7/8" stems (casters are available from the factory, if desired). Casters allow the unit to move through halls and rooms where forklifts are not practical.

Unit Installation

Downflow Discharge

If your data center has been designed to incorporate a raised floor, the space between the raised floor and subfloor may be used as an air distribution plenum or for a chase where ducting to discharge grilles may be installed. Downflow discharge units may be installed directly on the raised floor after ensuring the floor loading factor is satisfactory to support the unit.

Upflow Discharge

In data processing facilities designed for upflow discharge systems, air distribution is either through a supply

duct or through a discharge plenum into the conditioned space. The same unit location considerations for a downflow discharge system also apply to upflow discharge systems.

Airflow Company offers two methods of support for the CCT unit; (1) floor stands (2) pedestal mounts.

Floor Stand
When using a stand on raised floors, remove or cut the flooring to fit the flow stand dimensions. If the unit is close to a wall at the back, insure this gap is sealed with flooring or another type of partition. Place the flow stand in the correct location with the pedestals going into the pedestal socket on the floor stand and place the cork-rubber vibration pad under the pedestal. Once you have positioned the floor stand and pedestal arrangement, we suggest you put a small amount of adhesive between the pedestal and the pad, and between the pad and subfloor to keep the unit from moving. Level the floor stand assembly to within 1/4" using the adjustment nuts on the threaded pedestal legs. Seal all the way around the upper perimeter of the floor stand with a flexible airtight gasket or sealer to prevent air leakage. Floor stands are available from Airflow Company with ±1.5" adjustment range to meet 95% of the installation requirements without any modification to the floor stand assembly. If necessary, the threaded rod may be cut to meet specific installation requirements. We suggest that the leveling nuts be put on the rod before cutting in case the thread is burred or damaged when cut.

Pedestal Mounts
The unit has been supplied with pedestal sockets so that a floor stand is not necessary for system installation. When using pedestal mounts on a raised floor, cut the floor to fit the unit's frame perimeter. Level the unit to within 1/4" using the adjustable nuts on the pedestal legs. Seal the gap between the unit and the raised floor with a flexible air tight gasket. Use a small amount of adhesive between the pedestal, pad and subfloor to preclude pedestal movement.

Supply & Return Air Relief

Floor Discharge
An adequate number of perforated panels must be installed in the floor to allow for proper air distribution in the conditioned space.

Be sure to allow sufficient relief near the heavier heat loads.

Free Discharge
Free discharge systems provide conditioned air to the data processing facility through a discharge plenum with two-way adjustable grilles located on top of the air conditioners.

The discharge plenum is shipped separately from the CCT upflow discharge unit to facilitate handling. After installing the CCT unit, place the discharge plenum on top of the unit and bolt it into place using the hardware supplied.

Ducted Discharge
A discharge plenum is provided without air grilles for CCT units that are connected to a duct supply distribution system. The ducted discharge plenum is also shipped separately from the unit. Installation for this unit is the same as for a free discharge unit. Ducted discharge units should be located near the heaviest loads.

General — Air Distribution
The CCT unit provides full rated air delivery at 0.5 external static pressure. Therefore, the air distribution system (plus the return air duct and grilles if the return air is also ducted) should not exceed 0.5 inches wg. unless the nit has been specially ordered for an increased air pressure drop.

Connections — Mechanical

Piping Connections
Care must be taken when routing all service utilities to ensure that they do not block the air distribution system to the computer facility. Preferably, utilities should be located against the wall away from the blower discharge. NEVER run service utilities in front of the blower outlets.

CAUTION: ***Units are shipped from the factory with a holding charge. Use the multiple Schradder valves on the internal piping to remove the charge before any piping is attempted.***

Condensate Drain Connection
Condensate from the evaporator pan and discharge from the humidifier flushing system both drain through a trapped 7/8" ID drain in the bottom of the unit.

Emergency Drain Connection (Downflow Discharge Only)
The CCT downflow discharge unit is provided with a special secondary emergency drain pan to give added protection and time to react if the primary evaporator drain pan leaks or if any piping in the air handling section should develop a leak. A threaded flange connection is provided for contractor hookup in the bottom of the air handling section of the CCT unit. A "P" trap must be provided by the installing agency for the zero pressure drain.

The emergency drain system should be connected to the drain system below the unit condensate drain system connection. Failure to trap the emergency drain could cause improper operation of the entire condensate drain system.

Humidifier Connection
The humidifier inlet connection is in the bottom of the mechanical section. A 1/4" compression connection is supplied with the unit.

Installation - *continued*

Water Supply to Humidifier Connection

1. The humidifier fill valve(s) orifice is sized for supply water pressure from 30 to 85 psig.
2. For water pressure between 15 and 30 psig, notify the factory and a larger fill valve will be supplied.
3. For installation with less than 15 psig, notify the factory and a fill valve with a specially sized orifice will be supplied.
4. For cases above 85 psig, install a pressure reducing valve in the water feed line to the unit.
5. With extremely dirty or muddy water sources, proper filtration is required on the unit's entering water line.
6. DO NOT use softened water with the humidifier because it is too conductive.
7. DO NOT use completely demineralized water with the humidifier because it is the minerals that allow the electrode principle to work.
8. DO NOT use a hot water source. It will cause deposits to eventually block the fill valve orifice.
9. Water supplies with high conductivity (above 700 microhms) must be preconditioned for proper humidifier operation and longevity.
10. Consult the humidifier Operation & Maintenance Manual included with this CCT unit for more in-depth information and troubleshooting procedures.

Water/Glycol Piping Connections CCT ( ) W or CCT ( ) G

Care should be taken in correct connection of the water/glycol inlet and outlet connections.

It is recommended that shut off valves be installed for use during routine service and emergency isolation of the air conditioner.

For proper piping layout refer to Glycol Installation Drawing. pipe connection O.D. sizes are shown on pages 4 and 23.

Pressure Relief Valves

All water and glycol cooled units have pressure relief valves on the compressor discharge lines or condenser. They must be piped to outside of the computer room. Pipe size to be in accordance to specifications on the valve tag. Airflow Company is not responsible for damages caused by non-compliance to this warning.

Refrigerant Pipe Connections CCT ( ) A

When piping air cooled systems, care must be taken to use only clean refrigerant grad (Type L) pipe and follow standard procedures for pipe size selection. Maximum recommended distance between the evaporator and condenser is 300 equivalent feet. For any runs beyond this distance contact the factory for assistance. Vertical runs (hot gas) require a trap every 20 feet of rise. Refer to DX installation Drawing for correct piping arrangement.

RECOMMENDED LIQUID LINE SIZES R-22

Capacity BTU/hr	Condenser To Receiver	Receiver to Evaporator Equivalent Length, Ft. 50	100	150	200
6,000	⅜	¼	⅜	⅜	⅜
12,000	½	⅜	⅜	⅜	⅜
18,000	½	⅜	⅜	½	½
24,000	⅝	⅜	½	½	½
36,000	⅝	½	½	½	½
48,000	⅞	½	⅝	⅝	⅝
60,000	⅞	½	⅝	⅝	⅝
75,000	⅞	½	⅝	⅝	⅝
100,000	⅞	⅝	⅞	⅞	⅞
150,000	1⅛	⅞	⅞	⅞	⅞
200,000	1⅛	⅞	⅞	1⅛	1⅛

Recommended sizes are applicable with evaporating temperatures from -40°F to 130°F.

PIPING CONNECTION SIZES

See Chart on next page.

Connections — Electrical

All external electrical wiring should comply with N.E.C. and local codes. the unit must be grounded using an earth ground (***Water Pipe Grounds Are Not Allowed)*** or the warranty is void.

The CCT unit uses 3 phase power for operation. Bring the service cable up through the bottom left of the unit, through the mechanical section. and through the bulkhead hole near the electric box to the power distribution block provided on the left side of the electric box.

A non-automatic, high voltage, 3 phase disconnect is available as an option to replace the standard power distribution block. It is located in the same space as the power distribution block.

RECOMMENDED DISCHARGE LINE SIZES R-22

Capacity BTU/hr	Equivalent Length, Ft. 50	100	150	200
6,000	⅜	½	½	½
12,000	½	½	⅝	⅝
18,000	⅝	⅝	⅝	⅞
24,000	⅝	⅞	⅞	⅞
36,000	⅞	⅞	⅞	⅞
48,000	⅞	⅞	⅞	1⅛
60,000	⅞	1⅛	1⅛	1⅛
75,000	⅞	1⅛	1⅛	1⅛
	⅞	1⅛	1⅛	1⅛
100,000	1⅛	1⅛	1⅜*	1⅜*
	1⅛	1⅜	1⅜	1⅜
150,000	1⅛	1⅜	1⅜	1⅜
	1⅛	1⅜*	1⅜*	1⅜*
	1⅛	1⅜*	1⅜*	1⅜*
200,000	1⅜	1⅜	1⅝	1⅝
	1⅜	1⅜	1⅝*	1⅝*
	1⅜	1⅜	1⅝*	1⅝**

* Use one line size smaller for vertical riser

** Use two line sizes smaller for vertical riser

Recommended sizes are applicable with evaporating temperatures from -40°F to 130°F.

Piping Connection Sizes

MODEL	CCT-6	CCT-8	CCT-10	CCT-15	CCT-20	CCT-24	CCT-30
Air Cooled Connections							
Liquid Line†	½" O.D.	½" O.D.	½" O.D.	½" O.D.	⅝" O.D.	⅝" O.D.	⅝" O.D.
Hot Gas Line†	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅞" O.D.	⅞" O.D.	⅞" O.D.
Condensate Drain	⅞" O.D.	⅞" O.D.	⅞" O.D.	⅞" O.D.	⅞" O.D.	⅞" O.D.	⅞" O.D.
Humidifier Line	¼" O.D.	¼" O.D.	¼" O.D.	¼" O.D.	¼" O.D.	¼" O.D.	¼" O.D.
Hot Water (IN)*	⅝" O.D.	⅝" O.D.	⅞" O.D.	1⅛" O.D.	1⅛" O.D.	1⅛" O.D.	1⅛" O.D.
Hot Water (OUT)*	⅝" O.D.	⅝" O.D.	⅞" O.D.	1⅛" O.D.	1⅛" O.D.	1⅛" O.D.	1⅛" O.D.
Steam Reheat (IN)*	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅞" O.D.	⅞" O.D.	⅞" O.D.	⅞" O.D.
Steam Reheat (OUT)*	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅞" O.D.	⅞" O.D.	⅞" O.D.	⅞" O.D.
Steam Humidifier (IN)*	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅝" O.D.
ECWS (IN)	1⅜" O.D.	1⅜" O.D.	1⅜" O.D.	1⅝" O.D.	1⅝" O.D.	1⅝" O.D.	----------
ECWS (OUT)	1⅜" O.D.	1⅜" O.D.	1⅜" O.D.	1⅝" O.D.	1⅝" O.D.	1⅝" O.D.	----------
Water Cooled Connections							
Water (IN)†	1⅛" O.D.	1⅜" O.D.	1⅜" O.D.	1⅝" O.D.	1⅝" O.D.	2⅛" O.D.	2⅛" O.D.
Water (OUT)†	1⅛" O.D.	1⅜" O.D.	1⅜" O.D.	1⅝" O.D.	1⅝" O.D.	2⅛" O.D.	2⅛" O.D.
Condensate Drain	1⅛" O.D.	1⅜" O.D.	1⅜" O.D.	1⅝" O.D.	1⅝" O.D.	2⅛" O.D.	2⅛" O.D.
Humidifier Line	⅞" I.D.	⅞" I.D.	⅞" I.D.	⅞" I.D.	⅞" I.D.	⅞" I.D.	⅞" I.D.
Hot Water (IN)*	¼" O.D.	¼" O.D.	¼" O.D.	¼" O.D.	¼" O.D.	¼" O.D.	¼" O.D.
Hot Water (OUT)*	⅝" O.D.	⅝" O.D.	⅞" O.D.	1⅛" O.D.	1⅛" O.D.	1⅛" O.D.	1⅛" O.D.
Steam Reheat (IN)*	⅝" O.D.	⅝" O.D.	⅞" O.D.	1⅛" O.D.	1⅛" O.D.	1⅛" O.D.	1⅛" O.D.
Steam Reheat (OUT)*	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅞" O.D.	⅞" O.D.	⅞" O.D.	⅞" O.D.
Steam Humidifier (IN)*	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅞" O.D.	⅞" O.D.	⅞" O.D.	⅞" O.D.
ECWS (IN)	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅝" O.D.
ECWS (OUT)	1⅜" O.D.	1⅜" O.D.	1⅜" O.D.	1⅝" O.D.	1⅝" O.D.	1⅝" O.D.	----------
	1⅜" O.D.	1⅜" O.D.	1⅜" O.D.	1⅝" O.D.	1⅝" O.D.	1⅝" O.D.	----------
Glycol Cooled Connections							
Glycol (IN)†	1⅛" O.D.	1⅜" O.D.	1⅜" O.D.	1⅝" O.D.	1⅝" O.D.	2⅛" O.D.	2⅛" O.D.
Glycol (OUT)†	1⅛" O.D.	1⅜" O.D.	1⅜" O.D.	1⅝" O.D.	1⅝" O.D.	2⅛" O.D.	2⅛" O.D.
Condensate Drain	⅞" I.D.	⅞" I.D.	⅞" I.D.	⅞" I.D.	⅞" I.D.	⅞" I.D.	⅞" I.D.
Humdifier Line	¼" O.D.	¼" O.D.	¼" O.D.	¼" O.D.	¼" O.D.	¼" O.D.	¼" O.D.
Hot Water (IN)*	⅝" O.D.	⅝" O.D.	⅞" O.D.	1⅛" O.D.	1⅛" O.D.	1⅛" O.D.	1⅛" O.D.
Hot Water (OUT)*	⅝" O.D.	⅝" O.D.	⅞" O.D.	1⅛" O.D.	1⅛" O.D.	1⅛" O.D.	1⅛" O.D.
Steam Reheat (IN)*	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅞" O.D.	⅞" O.D.	⅞" O.D.	⅞" O.D.
Steam Reheat (OUT)*	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅞" O.D.	⅞" O.D.	⅞" O.D.	⅞" O.D.
Steam Humidifier (IN)*	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅝" O.D.
PreCooled Connections							
Glycol (IN)†	1⅜" O.D.	1⅜" O.D.	1⅝" O.D.	2⅛" O.D.	2⅛" O.D.	2⅛" O.D.	----------
Glycol (OUT)†	1⅜" O.D.	1⅜" O.D.	1⅝" O.D.	2⅛" O.D.	2⅛" O.D.	2⅛" O.D.	----------
Condensate Drain	⅞" I.D.	⅞" I.D.	⅞" I.D.	⅞" I.D.	⅞" I.D.	⅞" I.D.	----------
Humdifier Line	¼" O.D.	¼" O.D.	¼" O.D.	¼" O.D.	¼" O.D.	¼" O.D.	----------
Hot Water (IN)*	⅝" O.D.	⅝" O.D.	⅞" O.D.	1⅛" O.D.	1⅛" O.D.	1⅛" O.D.	----------
Hot Water (OUT)*	⅝" O.D.	⅝" O.D.	⅞" O.D.	1⅛" O.D.	1⅛" O.D.	1⅛" O.D.	----------
Steam Reheat (IN)*	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅞" O.D.	⅞" O.D.	⅞" O.D.	----------
Steam Reheat (OUT)*	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅞" O.D.	⅞" O.D.	⅞" O.D.	----------
Steam Humidifier (IN)*	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅝" O.D.	⅝" O.D.	----------

Outdoor Heat Exchanger Installation — General

The Outdoor Heat Exchanger should be located in a high security area. Consideration must be given to ensure a minimum of 24 inches clearance from any adjacent wall. The area should be clear of paper and debris that might be drawn into the coil.

Be aware of air movements that may cause short circuiting of the entering and leaving condenser air.

The heat exchanger must be mounted on a level surface with sufficient support to carry the unit's weight when fully charged. The heat exchanger has mounting holes to permit the unit to be bolted down to prevent shifting. Consult the outside heat exchangers Installation Manual for proper set-up.

Before operation, all Outdoor Heat Exchangers should be checked as follows:

1. Check set screws on all fan hubs.
2. Ensure that fans turn freely and that the blades are not distorted.]
3. Insure that fans rotate in proper direction.

The installing agency should provide a main power disconnect to isolate the heat exchanger during routing service or an emergency. Consult the outside heat exchanger electrical data table for specific electrical information.

Dry Cooler and Pump Package Installation

Provide sufficient valves and unions to isolate the dry cooler and pump package during routine service or in the event of an emergency.

Pipe should be welded or sweated wherever possible to minimize leak possibility.

Pipe and wire the dry cooler/precool system in accordance with local and national codes. A wiring diagram is attached to the inside of each control panel cover. The control enclosures are weather protected and should be mounted close to the header end of the drycooler. All thermostats should be checked for the proper setpoint per the wiring diagram. Any remote bulb thermostats should be mounted at this time.

The pump package is weather-protected and has been factory wired with branch fusing and pump motor overloads. Consult the name plate for electrical information on the pump package for disconnect sizing. Your pump size may have been increased or decreased from the standard pump package due to pressure drop requirements.

The pump package should be mounted as close as possible to the drycooler and the glycol solution should flow from the drycooler to the pump package.

The expansion tank with airtrol fitting must be mounted at the highest point in the piping system. A fill hose bib should also be provided to facilitate filling the system.

Installation of an air separator will enhance the ability to remove the air during start-up.

Air cooled Condenser Installation
All refrigerant piping should comply with ASHRAE national and local codes. Use only refrigerant grade pipe, and pipe joints should be high temperature brazed.

Pressure relief valves and a charging port should be piped into the high pressure side (compressor discharge side) of the refrigerant system.

The discharge line should loop above the hot gas header at the condenser.

The risers must be properly sized to ensure oil return.

Refer to the DX Installation Drawing for proper pipe routing.

Discharge lines should be sized to maintain sufficient return oil to the compressor by maintaining high gas velocity while keeping the refrigerant pressure drop within normal ranges.

Piping should be adequately supported, and should allow for normal expansion and contraction. See recommended liquid and discharge *line sizes on page 4.*

Motor Speed Controller For Air-Cooled Condenser Pressure Sensing Type

The fan speed control box is factory mounted to the outside heat exchanger opposite the piping header.

Wiring should be performed in accordance to the diagram attached to the control box. Two 24 VAC control wires are required to run between the CCT unit and the fan speed control.

Flooded Condenser Systems

Flooded Condenser Systems have the control box factory mounted on the outside heat exchanger. Line voltage is required but no control connection between the CCT unit and the outside heat exchanger. The fans are operated by pressure switches sensing refrigerant head pressure at the outside heat exchanger.

Fan Cycling

Fan Cycling controls are factory mounted to the outside of the outside heat exchanger opposite the piping header. Line voltage is required but no control connection between the CCT unit and the outside heat exchanger.

Charging The System

Air Cooled

The CCT Air Cooled System has been factory dehydrated and is shipped with a holding charge of R-22 refrigerant. Do not connect the CCT unit to tubing that has not been cleaned and dehydrated.

All refrigerant connections should be leak tested before the system is charged with refrigerant. The complete system should be pressurized to 250 psig with refrigerant and dry nitrogen. Use an electronic leak detector to carefully check each joint. Leaks should be repaired and the system pressurized again to 250 psig to double check all joints.

After the leak check has been performed, a vacuum pump should be used to evacuate the total system (CCT unit, condenser and interconnecting piping) after the condenser has been installed in the system. Pull a vacuum on the total system of 29 inches or 50 microns and hold it for four hours. Then break the vacuum with dry refrigerant. Repeat the process three times. At this point the system can be fully charged and you can be assured that nearly all of the non-condensables have been removed.

All CCT units are shipped from the factory with a holding charge of refrigerant and must be fully charged with R-22 at the time of installation. When charging a unit you must use a clean, dry refrigerant.

Connect the charging hose to the charging port of the liquid line valve, making sure to purge the charging hose of all air before connecting it to the charging port. Open all discharge, suction and liquid line valves.

Move the valve off its back seat and add LIQUID refrigerant until the unit pressure equalizes the refrigerant cylinder pressure. Close the charging port of the liquid line valve.

Move the charging hose to the charging port of the suction valve and purge the charging hose of all air. Start the compressor and continue to add refrigerant GAS until the liquid line sight glass is clear. When the system is properly charged the superheat should be nominally 15° and the sub cooling 10°.

Water/Glycol Cooled Refrigerant System

CCT water cooled data center air conditioning systems have been factory charged with R-22 refrigerant. This system is charged by using a weighted R-22 charge. Use the following chart for the correct amounts.

R-22 TOTAL SYSTEM CAPACITY CHART

CCT-6-W/G/PC	7.50 LBS	(+ 1 Lb)
CCT-8-W/G/PC	10.00 LBS	(+ 1 Lb)
CCT-10-W/G/PC	12.50 LBS	(+ 1 Lb)
CCT-15W/G/PC	18.70 LBS	(+ 1 Lb)
CCT-20/G/PC	25.00 LBS	(+ 1 Lb)
CCT-24-W/G/PC	25.00 LBS	(+ 1 Lb)
CCT-30-W/G/PC	37.50 LBS	(+ 1 Lb)

System capacity should be divided by 2 for charging only 1 of 2 circuits or divide by 3 for CCT-30.

Glycol / PC / System

The OCCT glycol cooled units require filing the glycol coolant circuit with glycol/water solution. After checking to be sure that the system is pressure tight and leak free, fill the system through the filing bib at the expansion tank following these steps:

1. Flush the system thoroughly with a trisodium phosphate solution. Follow the individual supplier's recommendation for using this product.
2. The CCT Series is designed to operate with a 40% glycol mixture. Pre-mix to this % before adding to the system. Do not add the glycol and chase it with water. It will not mix.
3. Remove air from piping or high head pressures will result.
4. ***Do not add water and then glycol to the system. Use glycol with corrosion inhibitors that do not react with zinc piping (galvanized piping if that has been used in the system). Glycol will react with chromate water additives, pipe dope, cutting oils, solder flux and other system dirt to form a sludge. This sludge will not allow proper heat transfer through the system and will cause the unit to operate erratically.***

Solution should be checked each year using a suitable hygrometer to allow for inhibitor concentration and temperature factors. The manufacturers of glycol should be consulted for these effects.

The use of ethylene glycol with inhibitors is required for corrosion protection. Suggested manufacturers are Dupont, Union Carbide, and Dow Chemical Company.

Solutions above 40% mixture must be approved by Airflow Company.

Flooded Condensers

Charging should be accomplished similar to air-cooled units with fan speed control. The receiver should be charged after the sight glass clears in accordance with Sporlan Valve Company Bulletin 90-30-1, Tables 1, 2, and 3 use the following chart.

Humidifier Operation

Your CCT environmental control unit is equipped with a pure steam generator type humidifier as a standard feature.

Check all electrical connections for wires which may have become loose in shipping.

Components burnt due to loose connections are NOT covered under warranty.

Check electrode plugs to ensure they are pressed firmly on to the electrode pins. *Important: Loose connections will cause overheating of the cylinder plugs and probable melting of the plugs and/or cylinder.*

Turn on the main disconnect in the primary service feeding the unit and check that the unit has power at the primary terminal block.

On the humidifier controller attached to the left side of the humidifier assembly, push the black switch to "Auto/On" so that is clicks into the depressed position.

Water will star to enter the cylinder through its bottom port and rise in the cylinder to a point determined by the solid state control circuitry.

It is not unusual upon initial start-up for the water to fill the cylinder and cycle on the red change cylinder light. The high level probe simply acts as a safety to shut off the fill valve and prevent overfilling. With the red light on, the water in the cylinder will continue to heat and after a few minutes start to boil. After the boiling action of the water has lowered the water level below the sensor at the top of the cylinder, the red light and fill valve will continue until the unit's full output capacity is reached after which the water level will automatically lower itself in the cylinder. (The increased mineral concentration allows for lower electrode coverage while maintaining the same steam output.)

When a stablizied condition is reached, the water will be boiling close to the cylinder seam level. The solid state circuitry will maintain the proper concentration in the cylinder by introducing short drains only when necessary. If the cylinder is manually drained, the above process will repeat itself.

Note: The CCT unit must be in the humidifcation mode to fill or to manually drain.

Areas With Low Water Conductivity

Should normalization of the unit be required immediately after start-up, the installer may speed up the process by artificially increasing water conductivity. The installer should dissolve not more than half a teaspoon of table salt in a cup of water and add it to the cylinder by means of the fill cup attached to the plumbing section during a fill cycle.

Excessive amounts of salt will result in erratic operation of the unit, however, normalization of the unit will be obtained automatically through the solid state control sequence.

For further information, consult the Humidifier Operation and Maintenance manual included with each unit.

Initial Start-Up

After all mechanical and electrical service connections have been made and checked, *Start the unit as follows:*

NOTE:
If at any time during performance of the following steps the expected indication is not observed, refer to the appropriate trouble shooting action.

1. Refer to DataGuard Operation and Maintenance Manual "Getting Started" Section for controller operation.
2. Check for proper rotation of the blower motors. If rotation is incorrect, shut off the main power at the source dis-connect. Interchange any two of the three main line power leads to the power distribution block in the CCT ( ) unit, return to DataGuard Manual.
3. Acknowledge any alarms that appear on the display at the controller's prompts. The alarms are usually power loss, high or low temperature and high or low humidity.
4. The DataGuard will energize heat, cool, humidifcation or dehumidification circuits as required and display the appropriate alphanumerical messages for the unit's mode of operation.
5. The operation of the unit must be checked thoroughly. To accomplish this, the setpoints on the controller must be set to extreme conditions. Before checking extreme points, the computer equipment (Heat Load) must be installed. Depending on the temperature and humidity in the space at the time of installation, check either the stages of heating or cooling, or the humidification or dehumidification modes.
6. Refer to DataGuard Manual for changing setpoints to test all modes of operation.
7. Check that all safety alarms and controls function properly.
8. Refer to the Control System Section for exact explanation of the different modes of operation.

PreCool Units

Many of the procedures necessary to start a PreCool unit are similar to other CCT units. There are several key differences however, which will drastically affect the performance of the PreCool unit. When installing a CCT-( )-G( )-PC be sure to check the following:

1. Ensure that the bulb of the fluid sensing thermostat has been attached to the entering glyco/water line and insulated.
2. Check the fluid sensor setting which senses the incoming glycol/water temperature. The fluid sensor setpoint is defaulted at 50°F to enable the unit for precool operation.
3. Check the ambient thermostat on the outside unit. The thermostat should be set at 50°F to allow proper switchover of control from outdoor heat exchanger to PreCool control.
4. Check the fluid sensing thermostat in the precool control box. The setting should be at 85°F and 45°F, outdoor heat exchanger and precool control respectively. Both sensing bulbs should be located on the glycol line that leaves the outdoor heat exchanger.
5. Check the precool modulating motor operation. When filling the system with glycol, the 3-way valve must be opened to exhaust the air from the precool coil.
6. Check the shipment. Received with the unit should be a single or dual pump package which included one or two pumps and a separate control box, contrary to straight glycol systems where the pump and controls are in the same box.

Control/Safety Adjustments

After the installation and start-up of the CCT unit has been completed, "fine tuning" of the system's controls and safety systems is necessary as described below:

Belt Tension

The blower motor is mounted on an adjustable base. Belt tension can be increased or decreased by raising or lowering the base.

A deflection of about 3/4" to 1" per foot of span between the blower and motor pulleys should be obtained by pressing the belt firmly. The adjusting belt should be locked in position after adjustment is made.

WARNING

Too much tension will shorten bearing, shaft and belt life.

For quiet operation, the belt should be as loose as possible without slippage. Slippage may result in belt squeal or insufficient airflow, or both. A simple test for the belt slippage is to check the temperature of the smaller pulley in relation to the larger pulley. If the smaller pulley is noticeably warmer, this is an indication of belt slippage and the belt should be tightened slightly. ***Do Not Test Temperature While Pulleys are Turning.***

Belt tension should be readjusted if the variable speed pulley setting is changed or if the belt is replaced.

Motor Pulley

The pulley on the blower motor has a variable pitch diameter to allow the blowers to be sped up or slowed down to compensate for higher or lower external static pressure, or in some cases, high altitude compensation.

The motor pulley has been factory sized and the unit has been factory tested with the pitch in the middle of its adjustment range.

To increase blower speed, remove the belt from the pulley by taking it off the larger non-adjustable blower pulley first. Loosen the set screw on both movable sheaves. Turn them inward toward the center stationary sheave to increase the effective pitch diameter. To decrease the blower speed, spread the sheaves further apart.

Turn Both Sheaves the Same Number of Times.

This is necessary to maintain uniform tension on both belts.

Tighten the set screws again, making sure that they are not on the threaded portion of the sheave, and put the belts back on.

Check for proper alignment between the driving and driven sheaves (pulleys). Improper alignment will cause premature wear on the blower belts.

Air Pressure Differential (APD)

The CCT unit uses an air pressure differential switch to sense airflow loss through the unit. The APD is factory set to make the switch close at 0.2 inches W.G. across the internal APD bellows. The pressure setting is adjustable by turning the adjustment screw clockwise to increase the setting.

Clogged Filter Switch

The clogged filter switch senses the air pressure drop across the filters. When the pressure drop is too high due to dirty filters, the switch closes and causes an alarm. While the clogged filter switch has been set at the factory for approximately 1.0 inches of pressure drop across the filters, the setting should be checked at unit start-up. Cover one-third of the filter area and increase or decrease the clogged filter switch sensitivity so that the switch closes when one-third of the filter area is block. ***This Procedure Can Only Be Used With New, Clean Filters.***

Overload Relay

The blower motor starter has an adjustable overload relay. The adjustment dial should be set to correspond to the full load amperes (FLA) on the blower motor. The overload has a manual reset button to prevent the motor from cycling on the overload switch.

Water/Glycol Regulating Valve

All glycol and water cooled CCT Series units are supplied with discharge pressure actuated valves to control the water or glycol flow thru the condensers. The valves should be adjusted to control the water cooled systems at 105° condensing temperature and the glycol systems at 130° condensing temperature.

Smoke Detector

This detector is not adjustable and can be activated by dust and/or smoke. Due to the electrical latching circuit in the detector, all line power must be removed from the unit then reapplied to reset this device.

Control/Safety Adjustments - *continued*

Low Pressure Switch

The low pressure switch acts as both a control and safety device. As a safety device, it turns the compressor off when the suction pressure is too low, thereby preventing liquid slugging back to the compressor.

As a control device, it allows the compressor to continue to operate after the liquid line solenoid closes, until there is no more liquid refrigerant in the evaporator coil, thereby "pumping the system down," and precluding the possibility of liquid "Slugging" the compressor. The above is applicable only to 7 1/2Hp and above.

The low pressure switch has a knurled nut adjustment that has been factory set at 20 psig. To increase the pressure setting, turn the knurled nut clockwise; to decrease the pressure setting, turn the nut counterclockwise.

High Pressure Switch

The high pressure switch acts as an electrical safety to prevent the build up of pressure in the DX piping. The switch is factory set to trip at 360 psig. Once it is tripped it must be manually reset.

Post Start-Up

1. After the unit has been thoroughly checked for operation, set the temperature and humidity to the computer manufacturer's desired setpoints. (Read the DataGuard Operation and Maintenance Manual carefully to configure your system to its own individual requirements.)

2. Complete the start-up sheet with each unit. This must be filled out in detail and returned to Airflow Company to maintain the two year warranty.

Preventive Maintenance

The operating life of the CCT Series System can be extended by following a simple preventive maintenance schedule. The schedule will reduce the possibility of failure of components and unnecessary malfunction of the system. The service technicians must be thoroughly familiar with the special design features of this equipment before attempting any service or repair.

Monthly

1. Check that filters are clean and in place.
2. Check that condensate drain is open.
3. Check that humidifier cylinder replacement light is not on and verify operation of the humidifier.
4. Check that drive belts are in good condition and that the belt tension is correct.
5. Clean inside of unit as necessary.
6. Check that the blower/shaft assembly turns freely.
7. Check unit for conformance to temperature and humidity setpoints.
8. Check the DX system for signs of refrigerant leaks.
9. Check the water/glycol system for leaks.
10. Check the DX system for proper operation.
11. Ensure heater operation.
12. Check electrical components and ensure correct amp draws and secure connections.
13. Check the DataGuard configuration.
14. Check the DataGuard for any alarms.

Seasonally

1. Check electrical components for loose wire connections.
2. Check fan(s) and drive components.
3. Check glycol % if applicable.
4. Complete all items listed on the monthly checklist.

Annually

1. Thoroughly check the system and clean unit interior.
2. Clean the cooling coil.
3. Perform all items listed on the monthly and seasonal checklist.

Bi-Annually

1. Lubricate the blower motor bearings if applicable.
2. Perform all items listed under the preventive maintenance schedules.

Programmed Maintenance Alarms

It is possible to set the program of the DataGuard controller to display "run time alarms" at designated intervals.

Refer to the DataGuard Operation and Maintenance Manual for details.