

# **CW Series**

## ***Precision Air Conditioning***



### **OPERATION AND MAINTENANCE MANUAL**

**February 10, 2003**

This manual provides information for installation, operation and preventive maintenance. The user should observe the guidelines and procedures presented herein to promote satisfactory performance. Due to an ongoing program dedicated to product improvement, specifications are subject to revision without notice. APC 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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# Introduction

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Congratulations on the selection of an APC environmental control system. The unit incorporates the latest system design innovations to provide you with optimum efficiency, reliability and control accuracy.

The CW Series System will provide years of trouble free service, provided it is installed and maintained by technically qualified personnel in accordance with the guidelines set forth in this manual.

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# The CW Series

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The APC CW series precision air-conditioning system provides precise environmental control for present and future conditioned spaces.

Precision environmental control requirements now reach far beyond the confines of the traditional data or computer room to encompass a larger suite of applications, referred to as technology rooms.

A worldwide network of APC representatives is fully qualified to provide engineering, sales, installation and service for our products.

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## Capacity

Available are 10 through 60 tons (35 kW–210 kW).

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## Air Pattern

Downflow units discharge air into the raised floor plenum eliminating the need for air distributing ductwork. Upflow units discharge air into either a plenum or ductwork.

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## Control

The microprocessor controller provides advanced integrated system operation and management ensuring simple, reliable and precise temperature and humidity control.

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## Configuration

**Chilled water.** Unit used with building chillers to provide economical and reliable control. These models often provide the optimum solution for large cooling needs due to ease of installation and the elimination of multiple refrigeration components. They can adapt to existing buildings serviced by chillers with sufficient capacity.

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## Serviceability

The access panels are held in place by captive latches to provide quick access to all sides of the unit, but require minimum space for removal. The unit has been designed for service access from the front and left sides.

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## Humidity Control

Humidity is managed through a self-contained steam canister humidifier for maximum efficiency and ease of maintenance. The pure steam canister maintains consistent capacity output, and requires very little or no scheduled maintenance.

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## Compliance

The CW Series has received agency approvals by ETL and MEA #175-82-E. Electrical systems comply with NEC and UL 1995 standards

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# Standard Features

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## Overall cabinet

Frame is constructed of heavy gauge steel for maximum strength. Steel access panels are insulated for quieter operation. Unit is designed for service access from the front and left sides.

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## Blower Assembly

The CW series includes multiple, centrifugal blower assemblies that have been engineered for quite, reliable operation. Lower blower speeds reduce noise and extend belt and bearing life. Permanently lubricated bearings, a single-belt variable pitch drive, and an adjustable motor base insure dependable operation. In addition, the air return patterns evenly distribute air across the cooling coil.

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## Electrical panel

The electrical panel contains the contactors, starters, overload protection devices, and input power circuit breakers. Each wire (except jumpers) is numbered every 3" (80 mm), or color-coded to facilitate circuit tracing when installing and servicing the unit. Each AC power circuit is individually branch circuit fused on all three phases. All motor devices are thermally and short circuit protected. The electrical panel is easily accessible from the front of the unit. An emergency cool override switch can be manually activated to initiate cooling and a field wired thermostat can be utilized to control cooling operation. All electrical components are UL-listed and recognized and all wiring conforms to NFPA 70 (NEC) and UL 1995 requirements.

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## Electric reheat

A three-phase electrical resistance heater sized to offset the sensible cooling capacity in the dehumidification mode is incorporated in each CW series unit. The reheat is three phase to provide even phase loading. Reheat elements are electrically and thermally protected.

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## Cooling coil

The advanced prism arrangement of cross-circuited cooling coils connected to the incoming chilled water supply provides greater sensitivity in cooling and dehumidification. More face area and lower velocity air offers quiet, efficient

cooling with less turbulence. The coil is constructed with copper tubes, aluminum fins, galvanized steel end plates and includes a stainless steel condensate pan.

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## Humidifier

The humidifier utilizes a pure steam generator specifically designed for hi-tech area environmental control. The pure steam eliminates contaminating mineral deposits, potentially deadly bacteria, white dust and excessive humidity. The humidifier requires little or no scheduled maintenance. Automatic flushing combined with an indicator that signals when the canister is to be changed, ensure maintenance free operation.

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## Air filter

The filtration of conditioned air is extremely vital to maintain the clean, particle-free environment required by the electrical equipment. The CW series uses 30% efficient 4" deep filters, with full depth filter pleats. Filters are easily replaced from the top on downflow units and from the front on upflow units.

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## Airflow sensor

Upon detection of a loss of air flow the microprocessor will deactivate: cooling, heating, humidification, and dehumidification. After the airflow has been restored for a predetermined period of time, the microprocessor will reactivate functions as needed.

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## Clogged filter alarm

An adjustable air pressure differential switch senses the pressure drop across the filters. Upon sensing an excessive pressure drop, the switch activates the alarm circuit of the microprocessor and displays a clogged filter message simultaneously with an audible signal.

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## Modulating valve

A fully modulating 2-or 3-way valve is microprocessor controlled to automatically direct the proper amount of chilled water into the cooling coil to maintain desired conditions. The pressure rating of the valve is 400 psi (2,700 kPa).

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# Optional Equipment

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## Smoke detector(s)

A factory-installed smoke detector is designed to sense smoke concentration in the return air stream. Upon detecting smoke concentration an audible and visual alarm will be activated and the unit will immediately shut down.

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## Firestat

A Firestat is available for installation in the air stream. If the return air temperature reaches 125° F (52° C), the air conditioner will be turned off and both an audible and visual alarm will be activated.

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## Water detector(s)

The solid-state water detector activates an audible and visual alarm on the microprocessor when moisture is detected. The water detector is provided with 15' of wire.

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## Remote relay shutdown

A factory-installed relay can be ordered with a 24V, 120V, or 240V coil to remotely disable the NetworkAIR system.

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## Essential/non-essential lockout

When facilities have limited backup power capacity, this lockout prevents the operation of electrical loads that are not *essential* for continued site operation.

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## Floorstand

The heavy gauge floorstand raises the unit above the subfloor to match the height of the raised floor. Heights are available from 6" to 36" in 3" increments. Adjustment is provided by threaded pedestals.

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## Air deflector

An air deflector ships loose and attaches to the floorstand for changing air direction from vertical to horizontal.

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## Plenum

The discharge plenum mounts on top of the upflow unit to direct and distribute conditioned

air. Manually adjustable, double deflecting grilles are provided on 3 or 4 sides.

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## Duct flange

A 1" (25mm) duct flange is installed on a unit to provide convenient connection to external ductwork. The duct flange can be installed at the air outlet on upflow units, at the air inlet on upflow rear return units, or at the air inlet on downflow units.

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## Dry contact closure alarms

Each unit can be equipped with any or all of the listed dry contact closures. Upon activation of the associated alarm, a discreet Normally-Open or Normally-Closed contact is available for remote monitoring of that discreet alarm.

- High Temperature Alarm
- Low Temperature Alarm
- High Humidity Alarm
- Low Humidity Alarm
- Fan Status Alarm
- Change Filter Alarm
- Fire Alarm (with addition of optional firestat)
- Smoke Detector Alarm (with addition of optional smoke detector)
- Humidifier Change Canister Alarm
- Water Underfloor Alarm (with addition of water detector)

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## Redundant group control

Allows up to six NetworkAIR units the ability to communicate with each other to automatically switch upon alarm condition, or timed rotation. Can also allow standby units the ability to assist the running system.

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## Remote display panel

The microprocessor controller allows facility or building-maintenance personnel to evaluate and control the unit from up to 50 ft. away from the unit, without having to enter the secured space.

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## Remote sensor(s)

Environmental sensors can be strategically placed, up to 50 ft. from the unit to better meet the sites cooling needs. The sensor must be positioned to permit air movement across the sensors.

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# Optional Equipment (continued)

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## **Environmental monitoring unit**

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A stand-alone unit performs continuous temperature and humidity sensing through two available probes (one included) and contact monitoring. The unit is controlled by available web, control console, or SNMP interface with network connection. In the event of an environmental anomaly, notification is sent to the customer via e-mail or SNMP. The unit is 18.25" x 9" x 2.75" (464 mm x 229 mm x 70 mm) and sits in or on top of a rack. The probes extend up to 12' (3.66 m) from the unit.

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## **Hot water or steam reheat**

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An on/off solenoid valve for steam reheat, or a modulating valve for hot water reheat maintains the dry bulb temperature when the system is in dehumidification and heat mode. Completely factory pre-piped, the system includes a copper tube, aluminum-fin reheat coil, solenoid valve, float, and thermostatic and steam trap for steam reheat only.

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## **High efficiency filter(s)**

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Pleated final filters with an efficiency of 40% and 60% (ASHRAE 52.2), 4" (102 mm) deep, allow the removal of a greater percentage of airborne particulate contaminants.

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## **Prefilter(s)**

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Intended to capture large airborne particulate contaminants, thereby extending the life of the high-efficiency filter. Prefilters are 1" (25mm) deep and easily disposable.

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## **Condensate pump**

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The factory installed and wired condensate pump will pump 36 gal/h (0.06 L/s) at 15ft. (4.6 m) head.

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# Installation

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## Computer Room Preparation

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During the design of the computer room, consideration should be given to the following factors: ease of entry, 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.

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## Unit Location

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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

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## Service Access

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At least 30 inches of clear space must be left in front of the CW Series unit and at least 24 inches on each side for access through the panels and to facilitate service.

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## Receiving the Unit

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Your CW unit has been completely tested and inspected prior to shipment from APC. 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 APC's technical service department for aid in repairing or replacing damaged parts. While APC 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.

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## Rigging

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The CW air conditioner is manufactured with a formed steel frame for maximum strength and unit integrity. However, as with all electrical/mechanical equipment, care must be taken in proper rigging of your CW unit. If you uncrate the unit 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 CW 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.

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## Unit Installation

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### 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 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 factory is satisfactory to support the unit.

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# Installation (continued)

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## **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.

## **FLOORSTAND**

When using a stand on raised floors, remove or cut the flooring to fit the floor stand dimensions. If the unit is close to a wall at the back, ensure this gap is sealed with flooring or another type of partition. Place the floorstand in the correct location with the pedestals going into the pedestal socket on the floorstand and place the cork-rubber vibration pad under the pedestal. Once you have positioned the floorstand 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 ¼" 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. Floorstands are available from APC with ?1.5" adjustment range to meet 95% of the installation requirements without any modification to the floorstand 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 floorstand 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 ¼" 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.

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## **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 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 CW upflow discharge unit to facilitate handling. After installing the 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 CW 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 load.

### **GENERAL – AIR DISTRIBUTION**

The CW direct expansion 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 unit has been specially ordered for an increased air pressure drop.

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# Installation (continued)

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## Connections - Mechanical

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### CHILLED WATER CONNECTIONS

Chilled water connections are located in the left bottom corner of the unit. Care should be taken in correct connection of the water inlet and outlet.

Caution – units are shipped from the factory with a holding charge. Use the Schrader valves on the internal piping to remove the charge before any piping is attempted.

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

Piping that is run underfloor where the chilled water temperature is below the dew point of the underfloor air must be insulated to prevent condensation from forming.

### CONDENSATE DRAIN CONNECTION

Condensate from the evaporator pan and discharge from the humidifier flushing system both drain through a trapped drain in the bottom of the unit.

### EMERGENCY DRAIN CONNECTION (DOWNFLOW ONLY) (OPTIONAL)

The CW 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 hookup in the bottom of the air handling section of the 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.

### OPTIONAL HUMIDIFIER CONNECTION

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

## 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
4. For applications 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. Minerals 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 CW unit for more in-depth information and troubleshooting procedures.

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## Connections - Electrical

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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 CW 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 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

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# Pre Start-Up

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Prior to initial start-up, perform the following checks to ensure proper unit operation:

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## ELECTRICAL CHECKS

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1. Check to make sure that incoming voltages match the nameplate's phase and voltage listings.
2. Make sure that the unit is properly grounded to an earth ground.
3. Check all internal electrical components and terminal blocks for loose connections, which may have been caused by shipping vibrations.
4. Check that all fuses are correct and securely in the fuse blocks.
5. Check the blower motor overload for correct setting (FLA of motor on motor nameplate) and make sure that the overload has not been tripped.

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## MECHANICAL CHECKS

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1. Make sure that the chilled water isolation valves, external to the unit, are open.
2. Check to make sure that chilled water is flowing through the unit.
3. Bleed any air from the unit's cooling system using the internally mounted Schrader valves.
4. Check for water leaks at the chilled water and/or humidifier water connections.
5. Make sure that the blower belts are adjusted correctly.
6. Ensure that the chilled water valve is fully seated.
7. Before replacing the unit's panels, make sure that the inside of the unit, especially the blower wheels, is free from debris.
8. Make sure that the air filters are in place and clean.

When all of these checks have been performed, replace and secure all of the unit's panels

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# Start-Up

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

1. Make sure that the power switch is in the OFF position and apply power to the unit. Turn unit disconnect switch to the ON position (if applicable) and verify that line voltage is as specified on the unit nameplate. Check the control transformer secondary voltage. This voltage should be a normal 24 volts, no higher than 26.5 volts and no lower than 23 volts.
2. Check for proper rotation of the blower motors. If rotation is incorrect, depress power switch to turn the unit off and shut off the main power at the source disconnect. Interchange any two of the three main line power leads to the power distribution block in the unit. Return to step one.
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 controller will energize heat, cool, humidification, or dehumidification circuits as required and display the appropriate alphanumeric messages for the unit's mode of operation.
5. The operation of the unit must be checked thoroughly. To accomplish this, the set points 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 humidification or dehumidification modes.
6. Humidification or dehumidification can be checked by changing the humidity set point in a similar manner.
7. Check that all safety alarms and controls function properly.

**Complete the start-up sheet and return it to APC.**

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# Control/Safety Adjustments

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

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## Belt Tension

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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 - 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 small 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.

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## Motor Pulley

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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.

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## Air Pressure Differential

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

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## Clogged Filter Switch

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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 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 blocked. This procedure can only be used with new, clean filters.

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# Control/Safety Adjustments

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## **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.

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## **FIRESTAT**

The firestat used in this unit has a manual reset and an adjustable temperature setting. The firestat is factory set prior to shipment to trip when temperatures above 125°F are detected.

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## **FLOW SWITCH**

If the unit is equipped with a flow switch, the sensitivity of the switch must be adjusted for the flow amount. Failure to do so will cause false alarms to occur.

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# Humidifier Operation

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Your CW Series unit may be equipped with a pure steam generator type humidifier as an option.

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 onto 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 it clicks into the depressed position.

Water will start 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 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 will go out and the fill solenoid will again open until the cylinder is again full. This cycling of 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 stream output.) When a stabilized 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 CW Series unit must be in the humidification mode to fill or to manually drain.

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## Areas with Low Water Conductivity

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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 equipped with a humidifier.

# Troubleshooting

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
Controls erratic or inoperative	Wiring improperly connected or broken.	Check wiring connections at schematic.
Airflow across coil is low.	Air blockage, incorrect blower rotation or external obstruction.	Check filters; clean if necessary.  Check for obstruction of airflow in duct system. Unit is designed for ½" s.p. (ext.) W.P. approximate.  Ensure correct rotation of evaporator blowers.
Blower fails to start	Power failure.	Check power source and input cable.
	Control circuit fuse blown.	Replace fuse.
	Defective contactor.	Repair or replace.
	Overload tripped.	Reset and check cause.
Chilled water valve fails to open	Set point set to high.	Adjust to desired temperature
	.	Check that there is 24VAC between terminals and the modulating motor. If not, check for loose wiring, blown control circuit fuse or low airflow.
System short of capacity	Valve not fully open	Check that linkage is adjusted and that when motor indicator is all the way down, the linkage is down. Check that the controller is set at the desired room temperature.
	Airflow is low	Check that blower inlets and outlet are not obstructed.  Check for dirty filters – replace as necessary.  Check for dirty coil – clean.  Check that blower speed is not too low due to belt slipping – tighten belt.

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# Troubleshooting

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<b>PROBLEM</b>	<b>POSSIBLE CAUSE</b>	<b>CORRECTIVE ACTION</b>
Humidifier inoperative.	No water supply to humidifier.	Turn on water. Clean humidifier inlet valve screen.
	Electrical connections loose.	Tighten electrical connections
	Humidifier fuses blown.	Check fuses and replace as needed.
	Relative humidity above the set point.	No corrective action needed.
Reheat elements inoperative.	Overheat switch open	Reset and check.
	Fuses blown.	Replace and check cause.
	Thermostat set too low.	None required. Adjust to desired temperature using controller.
Unit over-cools.	Set point set too low.	Adjust to desired temperature.
	Reheat inoperative.	Check reheat.
	Dehumidification with no reheat option.	Consult controller manual and disable dehumidification.
Functions will not operate. (Blower ON)	Unit not enabled.	Check for 24VAC.
	No power to controller.	Check control fuse
		Check F10 fuse on controller
Controller sensor gives incorrect reading for temperature or humidity.	Incorrect calibration.	Consult the Controller Operation and Maintenance Manual.

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# Preventive Maintenance

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The operating life of the CW 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 blower bearing/shaft assembly turns freely.
7. Check unit conformance to temperature and humidity set points.
8. Ensure heater operation.
9. Check electrical components and ensure correct amp draws and secure connections.
10. Check the microprocessor configuration.
11. Check the microprocessor for any alarm.
12. Check the chilled water valve and ensure correct operation.

## **SEASONALLY**

1. Check electrical components for loose wire connections.
2. Check fan(s) and drive components.
3. 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.

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# Warranty

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The limited warranty provided by American Power Conversion Corporation ("APC") in this Statement of Limited Factory Warranty applies only to Products you purchase for your commercial or industrial use in the ordinary course of your business.

## LIMITED FACTORY WARRANTY

### Terms of Warranty:

APC warrants that the Product shall be free from defects in materials and workmanship, for a period of (1) year from the date of start-up when APC authorized service personnel has performed the start-up of the Product, or a maximum 18 months from the date of Product shipment from APC, when APC authorized service personnel has not performed the start-up of the Product ("Warranty Period".) In the event that the Product fails to meet the foregoing warranty, APC shall repair or replace any defective parts, such repair or replacement to be without charge for on-site labor and travel if APC authorize personnel have conducted start-up of the Product. An APC Start-Up Service must be performed/completed by APC authorized service personnel or replacement of defective parts only will be covered. APC shall have no liability and no obligation to repair the installed Product if non-authorized APC personnel performed the start-up and such start-up caused the Product to be defective. Any parts furnished under this warranty may be new or factory remanufactured. THIS WARRANTY DOES NOT COVER circuit breaker resetting, loss of refrigerant, consumables, or preventative maintenance items. REPAIR OR REPLACEMENT OF A DEFECTIVE PRODUCT OR PART THEREOF DOES NOT EXTEND THE ORIGINAL WARRANTY PERIOD.

### Warranty Extends to First Purchaser for Use, Non-transferable:

This Warranty is extended to the first person, firm, association or corporation for whom the APC Product specified herein (herein referred to as "You or Your".) This Warranty is not transferable or assignable without the prior written permission of APC.

### Assignment of Warranties:

APC will assign to you any warranties which are made by manufacturers and suppliers of components of the APC Product and which are assignable. Any such warranties are assigned "AS IS" and APC makes NO REPRESENTATIONS as to the effectiveness or extent of such warranties, assumes NO RESPONSIBILITY for any matters which may be warranted by such manufacturers or suppliers and extends no coverage under this Warranty to such components.

### Drawings, Descriptions:

APC warrants for the Warranty Period and on the terms of the Warranty set forth herein that the APC Product will substantially conform to the descriptions contained in APC's Official Published Specifications or any the drawings certified and agreed to by an authorized APC representative, if applicable thereto ("Specifications"). It is understood that the Specifications are NOT WARRANTIES OF PERFORMANCE

and NOT WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE.

### Warranty Claims Procedure:

To obtain service under Warranty contact APC Customer Support at (800) 800-4APC. You will need the model number of the Product, the serial number, and the date purchased. A technician will also ask you to describe the problem. If it is determined that the Product will need to be returned to APC you must obtain a returned material authorization (RMA) number from APC Customer Support. Products that must be returned, must have the RMA number marked on the outside of the package, and be returned with transportation charges prepaid. If it is determined by APC Customer Support that on-site repair of the Product is allowed, APC will arrange to have APC authorized service personnel dispatched to the Product location for repair or replacement, in APC's discretion.

### Exclusions

APC SHALL NOT BE LIABLE UNDER THE WARRANTY IF ITS TESTING AND EXAMINATION DISCLOSE THAT THE ALLEGED DEFECT IN THE PRODUCT DOES NOT EXIST OR WAS CAUSED BY YOUR OR ANY THIRD PERSON'S MISUSE, NEGLIGENCE, IMPROPER INSTALLATION OR TESTING, UNAUTHORIZED ATTEMPTS TO REPAIR OR MODIFY, OR ANY OTHER CAUSE BEYOND THE RANGE OF THE INTENDED USE, OR BY ACCIDENT, FIRE, LIGHTNING OR OTHER HAZARD.

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