



**TECHNICAL MANUAL  
FOR  
INSTALLATION, OPERATION  
AND MAINTENANCE  
OF  
THE CAPTIVE-AIRE  
MODEL "C-ESP" SERIES  
POLLUTION CONTROL UNITS  
WITH CGPC-6000-ESP COMMAND CENTER**

**WARNING**

Improper installation, adjustment, alteration service or maintenance can cause property damage, injury or death. Read the installation, operation and maintenance instructions thoroughly before installing or servicing this equipment. Only trained and qualified service personnel should install or service this equipment.

**CAPTIVE-AIRE SYSTEMS, INC.**

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The Captive-Aire C-ESP Unit is designed and engineered by  
CAPTIVE-AIRE SYSTEMS, INC.  
360 Northbrook Drive, Youngsville, NC 27596.

# TABLE OF CONTENTS

INTRODUCTION .....	5
SPECIFICATIONS .....	6-7
MODEL NUMBER EXPLANATION .....	8
TYPICAL INSTALLATION .....	9
SAMPLE C-ESP CONFIGURATIONS .....	10-11
RECEIVING & INSTALLATION .....	12
EQUIPMENT LIFTING PROCEDURE .....	13
ASSEMBLING C-ESP HOUSING ON UNITS SPLIT FOR SHIPMENT .....	14-15
SMOKE CONTROL .....	16
C-ESP FIRE MODE .....	17-18
DAILY OPERATION .....	19-20
COMMAND CENTER INSTRUCTIONS .....	21-24
TIME CLOCK OPERATION .....	25
DETERGENT PUMP OPERATION .....	26-27
PREVENTIVE MAINTENANCE .....	28-29
CELL CONFIGURATION .....	30
SPARE CELLS .....	31
TROUBLE-SHOOTING – ESP SECTION .....	32-33
ODOR CONTROL .....	34-37
EXHAUST FAN SECTION .....	38-39
RP DEVICE INITIAL START UP .....	40
TROUBLE-SHOOTING – GENERAL .....	41-44
DETERGENT PUMP PARTS .....	45
CONTROL CABINET .....	46
SUB PANEL .....	47
NAMEPLATE DATA .....	48-49
TERMINAL VOLTAGES .....	50-51
WIRING DIAGRAM .....	52
OPTIONAL CONNECTION INSTRUCTIONS .....	53
PLC STATUS LIGHTS .....	54
DRAIN .....	55
SPRAY ODOR WIRING .....	56
SPRAY ODOR TERMINAL VOLTAGES .....	57
CGPC-6000-ESP SERIES CONTROL .....	58,60
CGPC-6000-ESP COMPONENT SCHEDULE .....	59,61
POWER PACK PARTS .....	62
CELL PARTS .....	63
MISCELLANEOUS PARTS .....	64
STARTUP INSTRUCTIONS .....	65
INSPECTION REPORT .....	66
WARRANTY .....	Inside back cover

Air quality is a major concern in many large cities world wide, particularly in America. As a result, many commercial kitchens will require pollution control equipment in their exhaust systems to comply with the increasing demands of environmental control agencies. In addition, pollution control equipment is being used for other reasons such as kitchens in high-rise buildings to allow the exhaust to discharge out the side of the structure saving the cost of running the duct up many floors to the roof.

Smoke pollution control, in kitchen exhaust systems, has typically been accomplished by any one of the following methods: gas fired incinerators, scrubbers, filtration units or electrostatic precipitators (C-ESP). Incinerators literally burn the pollutants and, while effective, can be very costly and hazardous to operate. Scrubbers consist of a water bath and extraction baffles to remove the pollutants and, though quite effective on grease removal, they typically require the addition of high efficiency filters to abate smoke below control agencies' standards. Filtration units use a series of impingement filters to remove the pollutants and done properly can be quite effective on both smoke and grease.

The Captive-Aire pollution control unit, model C-ESP, can be manufactured with either electrostatic precipitation (C-ESP) or Filtration (C-TPF). Captive-Aire has manufactured commercial kitchen exhaust systems since the early 1980's. When initial cost is a greater concern the C-TPF unit is a sound alternative.

The C-ESP unit is available in several configurations, as illustrated on the following pages, ranging in capacity from 1000 to 32,000 CFM (472 to 15,102 L/s). Most models can include an optional exhaust fan and odor abatement equipment.

### **Basic Facts About Smoke**

Smoke particles are extremely small and not visible to the human eye unless thousands of them are grouped together to form what we see as smoke. Individual particles are measured in units called microns and one micron equals 1/25,400 of an inch (1/64,516 of a cm).

Smoke generated by commercial cooking equipment has a particulate size of between 0.3 and 0.8 microns and it is these very small particles that smoke abatement equipment must remove from the air stream. The amount of smoke being discharged from a kitchen exhaust duct is measured in terms of its density, referred to as opacity - the degree to which emissions block light. A 100% opacity level would be solid black and 0% would be perfectly clear. Control agencies that have adopted smoke pollution ordinances are requiring an opacity level of no more than 20%, which is a very light blue smoke.

Typically, heavy smoke producing cooking such as charbroiling, creates an opacity level of 60% to 70%. Opacity readings are taken by the human eye by viewing the smoke being discharged and then assigning a percentage of opacity to what is seen. Though this method is quite subjective, it is the method practiced by control agency inspectors who are trained and certified in determining opacity percentages. Other more technical methods of determining opacity or particulate density are achieved through the use of opacity meters and

cascade impactors. This level of analysis is usually referred to as source testing. Control agencies occasionally require this type of analysis and if so, the testing is conducted by state certified contractors which can be quite costly and time-consuming. The efficiency of a C-TPF is based on how well it reduces the opacity level of a given airstream. The Captive-Aire unit will reduce the opacity level below 20%, thereby meeting the requirements of environmental control agencies.

### **Basic Facts About Odor**

Cooking odors (molecules) generated by the combustion of animal and vegetable matter result in an extremely complex mixture of reactive organic gases (ROG's). A small percentage of these odors may be absorbed by the grease particles but the vast majority exist separately in the airstream. The ROG molecules are much too small to be removed by any type of filter and therefore, other methods must be used. There are several methods with which to manage the odor. One method is to use a media bed. The two most popular types of media bed are activated charcoal, which absorbs and retains the odor molecules, and the use of an odor-oxidant media (potassium permanganate) which oxidizes the molecules to solids and then retains them. The other method involves the use of a liquid delivered with a finely atomized spray. This spray performs a similar function to potassium permanganate in that it adsorbs or chemically neutralizes odors. This process has the benefit of the end user being able to adjust the amount of spray and thus the effectiveness and cost of the odor control.

The life of the media bed type of odor control is dependent upon several factors such as how much media is used, type of odor, amount of odor molecules, grease loading and air temperature. Typically, any of the above mentioned types of media can remove 85% - 90% of the molecules. Determining the efficiency of odor control can be very subjective, as testing is usually conducted by the human nose. More scientific testing is available through ROG analysis, but this involves considerable costs.

### **Grease Removal - The Important First Step**

Grease particles are also measured in terms of microns and grease generated by commercial cooking equipment has a particulate size of 10 microns and up. Pollution control equipment is not limited to removing smoke particles, but will also remove a majority of the grease particles remaining in the airstream. Therefore, the grease extraction efficiency of the exhaust hood plays an important role in the operation and performance of pollution control equipment.

Removal of grease particles before they reach smoke and odor control equipment will significantly increase the smoke abatement efficiency and the life of the odor abatement media. It is highly recommended that a Captive-Aire Ventilator be used with the unit as it has a grease extraction efficiency of 95%. Other high efficiency exhaust hoods and standard filter type hoods may be used with the unit. Contact Captive-Aire Systems for details.

# SPECIFICATIONS

## General

Furnish one (1) Captive-Aire Pollution Control Unit model number C-ESP series as manufactured by Captive-Aire Systems, Inc. of Youngsville, North Carolina in accordance with the following:

The pollution control unit shall consist of a smoke control section, odor control section (optional) and an exhaust fan section (optional) all built on a common base as an integral unit. Smoke control shall be accomplished by electrostatic precipitation (ESP). The unit shall be ETL listed and labelled.

## Smoke Control Section

The smoke control section shall contain one or more electrostatic precipitator (ESP) cells to remove smoke particles from the air stream to a level no higher than 20% opacity when operated in accordance with the operation and maintenance guidelines. The ESP cells shall be of a floating plate design to eliminate plate warpage during high heat operation. The cells shall be positioned on slide tracks so that they may be easily removed through a hinged cell access door(s). For ease of handling, individual cells shall weigh less than 54 lbs. There shall be removable, cleanable debris screens located immediately upstream of the ESP cells and a moisture separator immediately downstream. An electrical panel mounted on the unit shall contain the high voltage power pack assembly, safety disconnect switch, main disconnect switch, fuses and a magnetic starter for the exhaust fan when fan is included. The safety disconnect switch shall interface with the electrical panel access door such that when opened it will shut off service to the power pack(s) and ground them to drain the residual electrical charge from both the power pack(s) and ESP cells. The ESP cell access door shall interface with the electrical panel access door so that it cannot be opened without first opening the electrical panel access door. The high voltage power pack(s) shall be self-limiting type and shall be self contained. The electrical panel shall include indicating lights to monitor cell and transformer voltage. The main disconnect switch for the exhaust fan and control circuits shall lock the electrical panel access door closed when in the "on" position. The unit shall contain one or more wash manifold(s) with brass spray nozzles to wash the ESP cells with hot detergent injected water each time the exhaust fan is shut off.

## Fire Detection

A thermostat, set at 250° F, shall also be located in the filter section to shut down the exhaust fan in the event of a fire.

### Optional Fire Damper for use in Canada

The unit shall include a UL listed fire damper, with a 280° F fusible link, located downstream of the filters to prevent passage of fire to the duct downstream of the unit

## Odor Control Options

### Media bed of 50/50 Blend Potassium Permanganate and Carbon Blend

The unit shall be provided with odor control utilizing a media bed of 50% potassium permanganate 50% carbon blend. The odor removal media shall be housed in slide out reusable steel modules. There shall be a 30% pleated media after filter lo-

cated immediately downstream of the odor control media. Replaceable filters shall be mounted in filter slide tracks to prevent air bypass around the ends of the installed filter bank. The odor control media and after filters shall be removable through side access doors with lift and turn latches.

### Spray Odor Control

The unit shall be provided with a spray odor control system utilizing an odor neutralizer chemical. The odor spray control cabinet shall be mounted on the side of the unit and shall contain a liquid spray compressor piped to the spray nozzle in the fan plenum, adjustable delay timers with fuse protected circuitry factory wired to the unit electrical panel. The cabinet shall include one 5 gallon container of Formula GS-710 Odor Neutralizer. The cabinet shall contain a heater to prevent freezing of the odor neutralizer.

## Exhaust Fan Options

### Exhaust Fan (Standard Centrifugal Fan)

The unit shall include a centrifugal exhaust fan. The exhaust fan shall be an upblast arrangement with a non-overloading wheel. The motor, drives, bearings and fan mounting base shall be located out of the exhaust air stream as required by the IMC (International Mechanical Code) and NFPA-96. The fan shall be ETL Listed and shall be AMCA certified and bear the AMCA seal for performance. The fan housing shall be constructed of heavy gauge steel. The fan bearings shall be heavy duty pillow block type rigidly mounted on heavy structural steel supports. The motor shall be ODP. The fan shall include a disconnect switch.

### Exhaust Fan (Optional Tubular Fan)

The unit shall include a tubular centrifugal exhaust fan. The exhaust fan shall be an arrangement #10 with a non-overloading BI, AF wheel. The motor, drives, bearings and fan mounting base shall be located out of the exhaust air stream as required by the IMC (International Mechanical Code) and NFPA-96. The fan shall be AMCA certified and bear the AMCA seal for performance. The fan housing shall be constructed of heavy gauge steel. The fan bearings shall be heavy duty rigidly mounted on heavy structural steel supports. The motor shall be ODP three phase mounted on a common base with the fan and shall be pre-wired to the electrical cabinet located on the unit. The electrical cabinet shall include a disconnect switch, motor starter, overloads and fuses. The factory provided drive assembly shall be adjustable pitch on 5 HP and smaller and fixed pitch on 7.5 HP and larger. It shall also be sized for a minimum 1.5 service factor. After final system balancing, fixed pitch sheaves shall be provided and installed by the air balancing contractor to provide proper flow at actual installed conditions.

## Unit Construction

The unit housing shall be constructed of a minimum of 16 gauge G90 bright galvanized steel. The perimeter base shall be 12 gauge formed channel with lifting lugs at each corner and along the length as required. The internal housing shall be externally welded liquid tight for compliance to the International Mechanical Code and NFPA-96 grease duct construction requirements.

# SPECIFICATIONS

## Fire Extinguishing System Options

*Specifier Note: NFPA-96 requires a fire extinguishing system for protection of the smoke and odor control sections and protection of the duct down stream of any filters or dampers. Not all authorities having jurisdiction require protection. Check with your AHJ. If required, specify one of the following systems.*

### Wet chemical system

Provide a complete factory mounted Ansul wet chemical fire extinguishing system, including nozzles piping and detection runs. Pipe penetrating the unit cabinet shall use a UL listed fitting. System shall be installed in accordance with the systems listing and NFPA-96. The Ansul Automan cabinet shall be mounted on the side of the unit for easy access, certification and service.

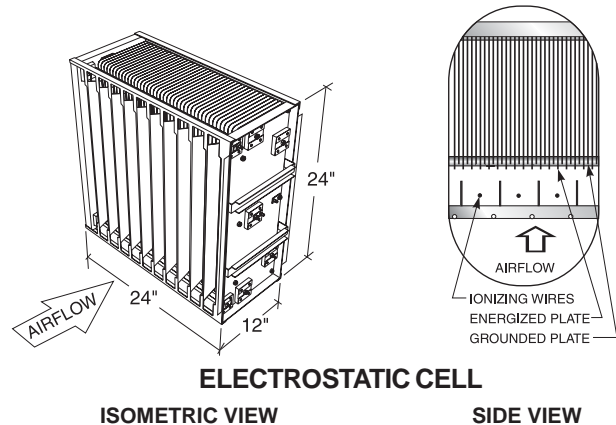
### Water spray sprinkler fire system

*Specifier Note: Units that are located indoors may be factory pre-piped for a wet pipe building sprinkler system.*

Provide a pre-piped water spray fire system installed in accordance with NFPA-96. The unit shall be piped with one pendant type sprinkler nozzle located in the smoke control section, one in the odor control section, if equipped with 50/50 media bed, and one in the exhaust fan section for interconnection to the building sprinkler system by the appropriate trades. Pipe penetrating the unit cabinet shall use a UL listed fitting. Nozzles shall be the bulb type rated at 325° F.

## Check Out and Demonstration

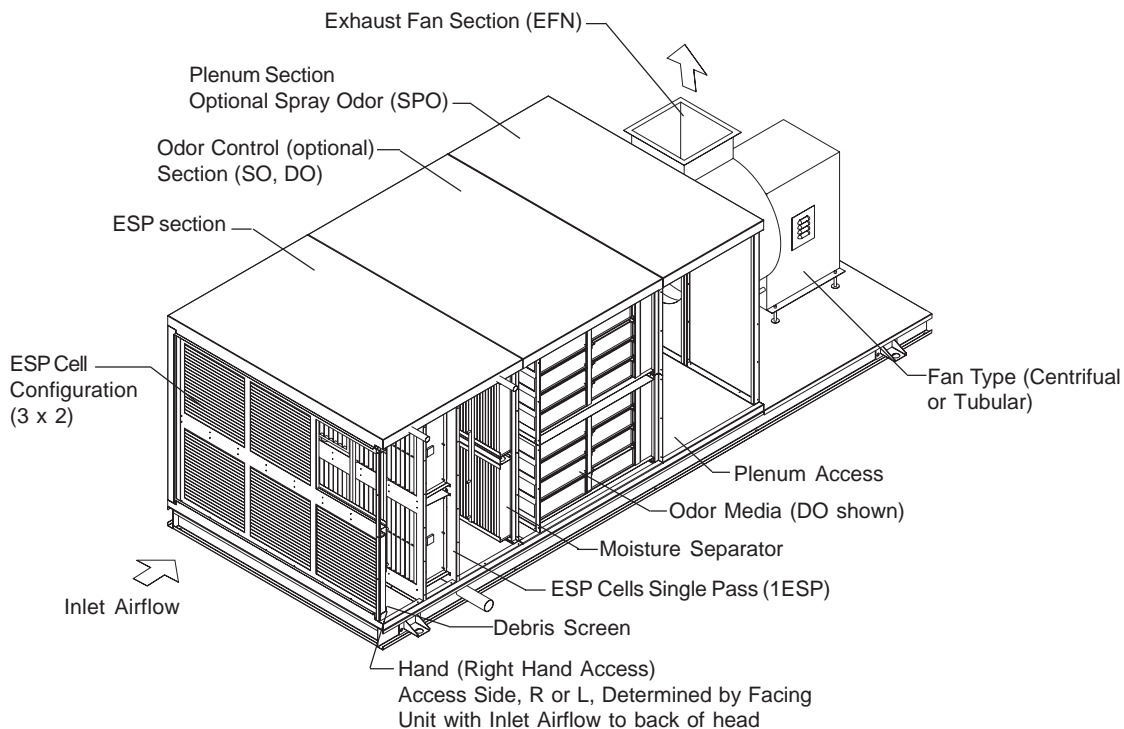
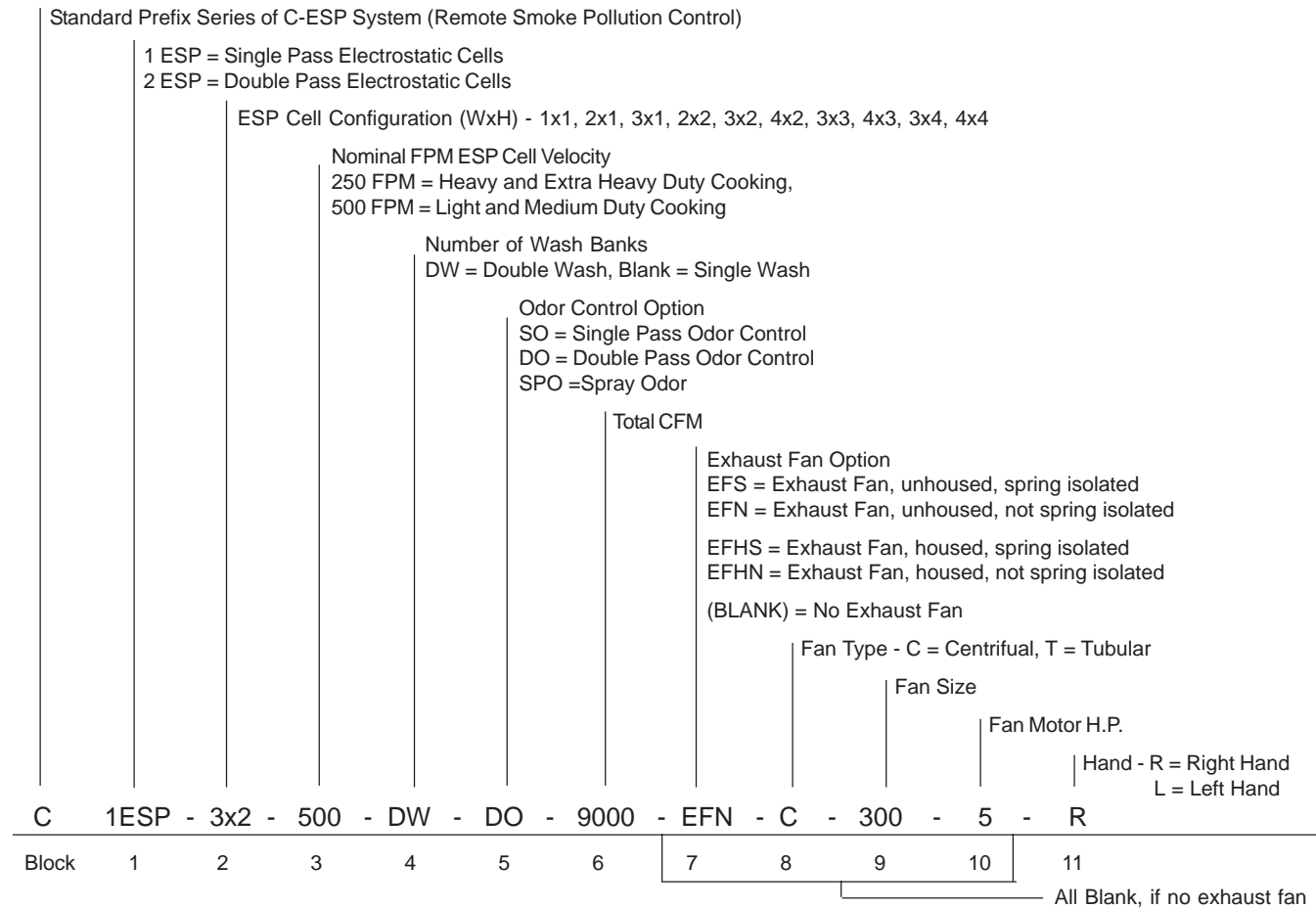
Upon completion of installation, the entire pollution control system, including the kitchen exhaust hoods, shall be commissioned by factory certified personnel. Start-up shall include checking all filters, filter monitoring station, odor control and exhaust fan. The appropriate maintenance personnel shall be given a technical manual and a complete demonstration of the system, including operation and maintenance procedures. Upon completion of the commissioning, a detailed start-up report shall be made available to the architect and owner certifying proper system operation. Changes required in fan drive components shall be performed by the air balancing contractor under the direction of the factory certified person(s) performing the start-up.



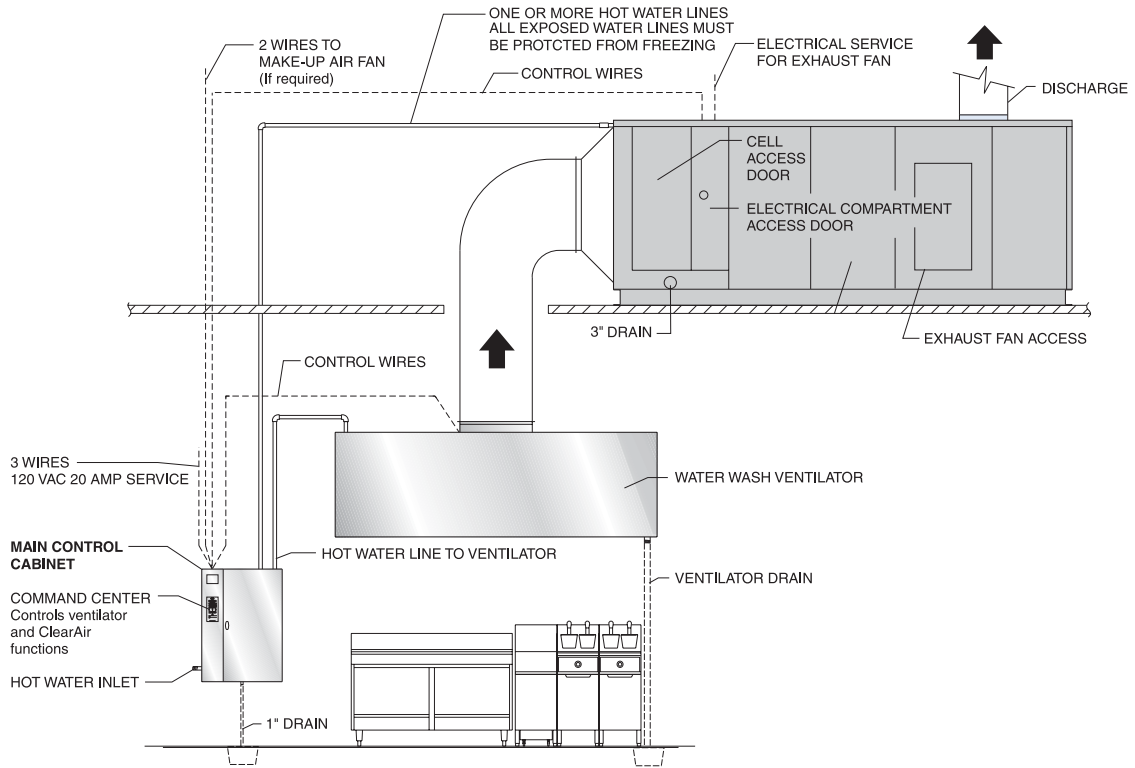
# MODEL NUMBER EXPLANATION

The assigned model number of a C-ESP unit will indicate the number of Cell Banks and if it has spray odor control, single or double pass odor control, if it has an exhaust fan plus other data. The following example shows the make-up of a model number.

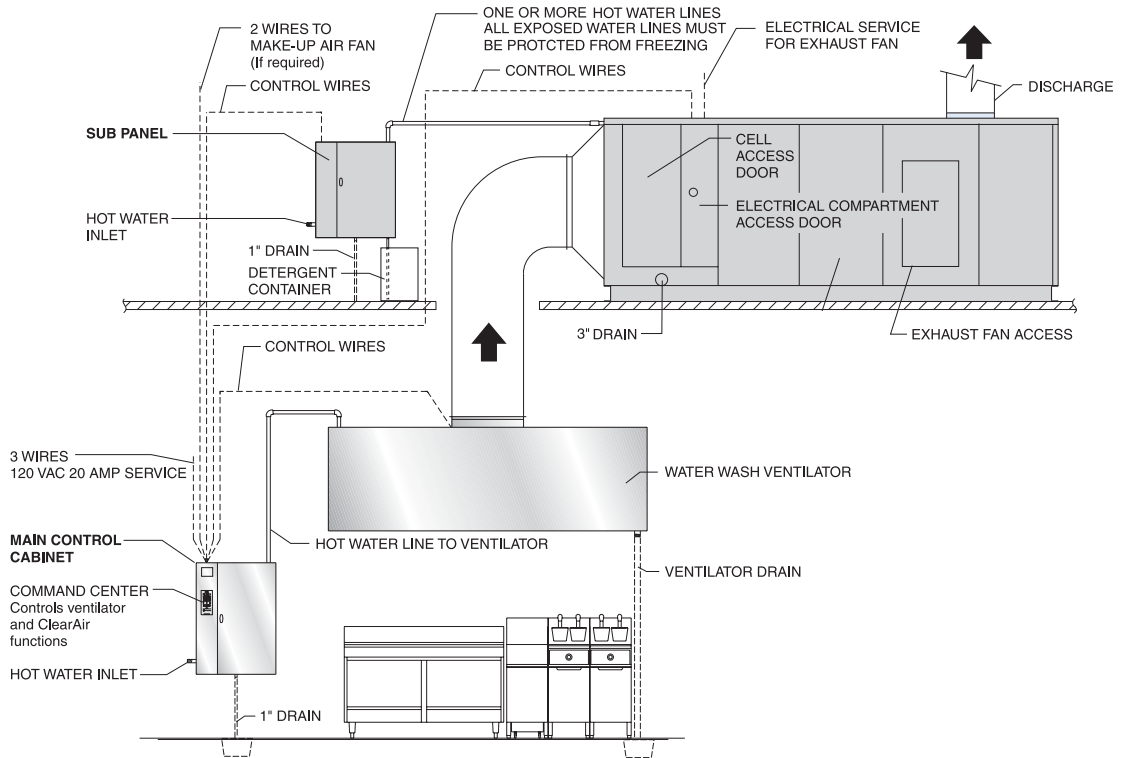
The model number of your C-ESP unit along with other data can be found on the nameplate which is attached to the electrical control panel on the unit. Refer to page 49.



# TYPICAL INSTALLATION



**TYPICAL SCHEMATIC**  
**WATER WASH VENTILATOR WITH MAIN**  
**CONTROL CABINET SERVING BOTH**  
**WATER WASH VENTILATOR**



**TYPICAL SCHEMATIC**  
**WATER WASH VENTILATOR WITH MAIN**  
**CONTROL CABINET SERVING VENTILATOR AND**  
**A SUB PANEL**

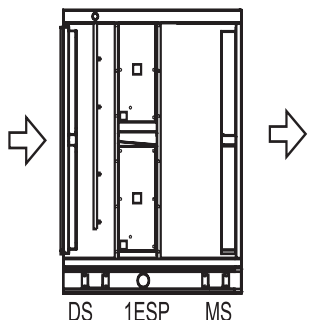


# SAMPLE C-ESP CONFIGURATIONS

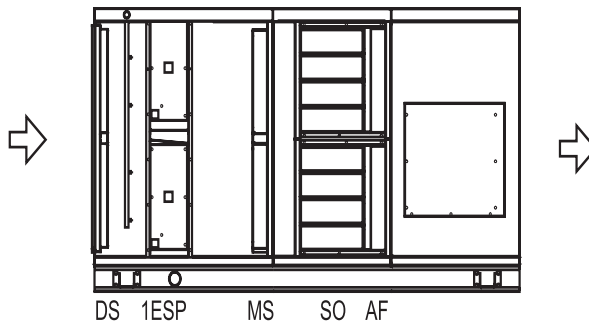
The Captive-Aire unit is available in sizes ranging in capacity from 1000 to 32,000 CFM (472 to 15,102 L/s). Each unit is equipped with Three Phase Filters for smoke control, and may include an exhaust fan, odor abatement equipment and Quencher System, or Ansul System as an option. The following illustrations are examples of the most common configurations.

### KEY

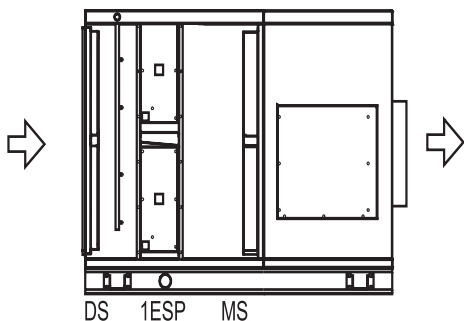
- |  |   |
|--|---|
| 1ESP = Single Pass Electrostatic Cells           | EFHS = Exhaust Fan, housed, spring isolated     |
| 2ESP = Double Pass Electrostatic Cells           | EFHN = Exhaust Fan, housed, not spring isolated |
| AF = 30% After Filter                            | FD = Optional Curtain Fire Damper               |
| DO = Double Pass Odor Kor48/Carbon blend         | MS = Moisture Separator                         |
| DS = Debris Screen                               | SO = Single Pass Odor Kor48/Carbon blend        |
| EFS = Exhaust Fan, unhooded, spring isolated     | SPO = Spray Odor Cabinet                        |
| EFN = Exhaust Fan, unhooded, not spring isolated |   |



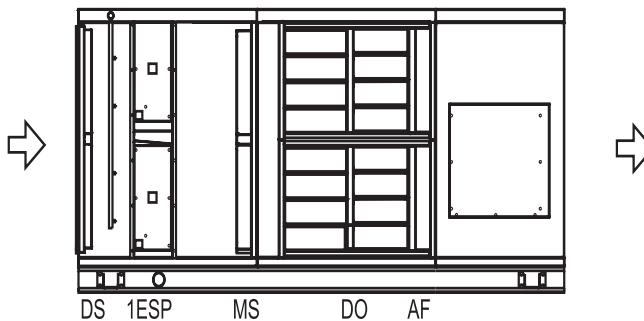
C-ESP  
SMOKE CONTROL ONLY  
(Remote Fan)



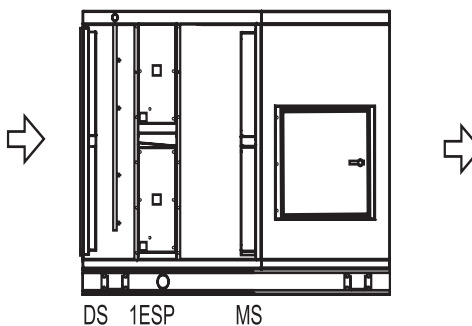
C-ESP-SO  
SMOKE CONTROL  
WITH SINGLE PASS MEDIA BED ODOR CONTROL  
(Remote Fan)



C-ESP  
SMOKE CONTROL  
WITH PLENUM  
(Remote Fan)



C-ESP-DO  
SMOKE CONTROL  
WITH DOUBLE PASS MEDIA BED ODOR CONTROL  
(Remote Fan)



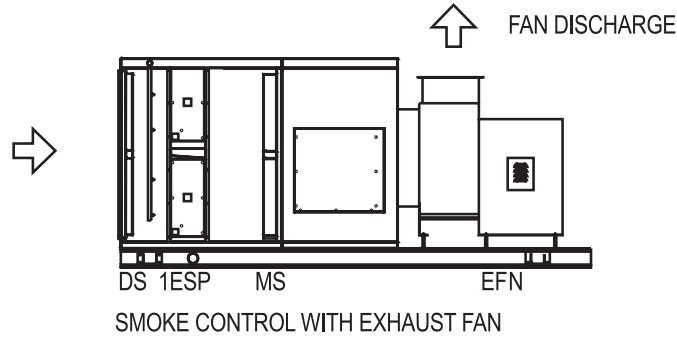
C-ESP-SPO  
SMOKE CONTROL WITH SPRAY ODOR CONTROL  
(Remote Fan)

# SAMPLE C-ESP CONFIGURATIONS

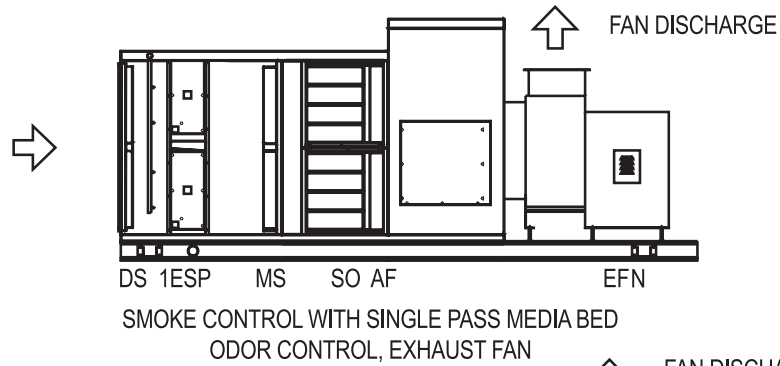
## KEY

1ESP = Single Pass Electrostatic Cells	EFN = Exhaust Fan, unhoused, not spring isolated
2ESP = Double Pass Electrostatic Cells	EFHS = Exhaust Fan, housed, spring isolated
DO = Double Pass Odor Kor48/Carbon blend	EFHN = Exhaust Fan, housed, not spring isolated
DS = Debris Screen	FD = Optional Curtain Fire Damper
DW = Dual Wash (2nd wash manifold)	MS = Moisture Separator
EFS = Exhaust Fan, unhoused, spring isolated	SO = Single Pass Odor Kor48/Carbon blend
	SPO = Spray Odor Cabinet

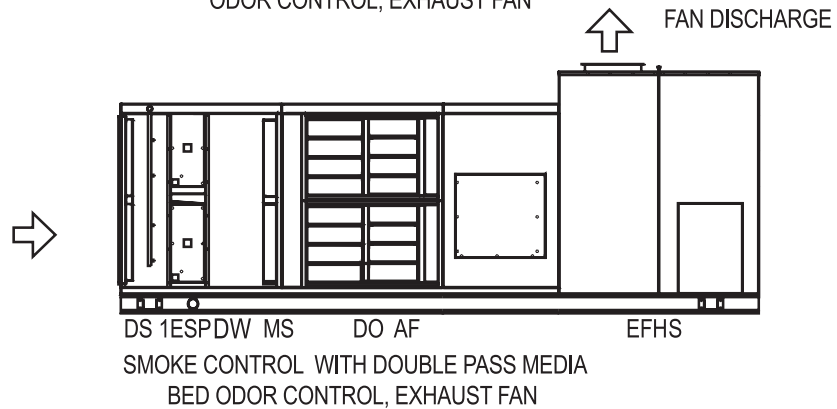
C-ESP-EFN



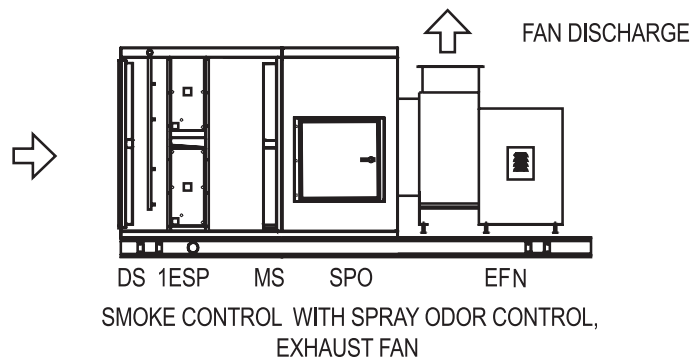
C-ESP-SO-EFN



C-ESP-DO-EFHS



C-ESP-SPO-EFN



## RECEIVING

Most C-ESP units are shipped in one piece. However, some units, because of size or special jobsite conditions, may be shipped in multiple sections. Follow the instructions provided with the unit to join sections back together. If the unit includes media bed odor control, the KOR48/carbon odor control media is packaged separately. Verify against the shipping documents that you have received all items and note any shipping damage, obvious or hidden, to your carrier and on your Bill of Lading. If damage is found, immediately file a claim with the transport company. All units are thoroughly inspected and fully operation tested at the factory prior to shipment.

Verify that the electrical and air flow ratings on the unit nameplate agrees with jobsite requirements. If a contradiction arises notify the factory prior to proceeding with installation.

## SAFETY CONSIDERATIONS

Installing and servicing the C-ESP unit can be hazardous due to the presence of electrical components. Only trained and qualified service personnel should install or service this equipment.

Untrained personnel can perform basic maintenance, such as cleaning and replacing filters. All other operations should be performed by trained service personnel. When installing or servicing, observe precautions in literature and on tags and labels attached to unit.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly.

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### WARNING

Before installing or servicing system, always turn off main power to system. There may be more than one disconnect switch. Electrical shock can cause personal injury or death.

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## RIGGING

All units are provided with a minimum of four (4) lifting points for rigging attachment. **WARNING:** Use all lifting points provided. (Refer to Page 13) Spreader bars are mandatory to prevent contact and damage to the unit by lifting hooks, straps, cables, or chains. Consult the mechanical or structural engineer before moving the unit across the roof deck.

## INSTALLATION CODES

This unit requires external plumbing and electrical connections to be made in the field. It is recommended that the Authority Having Jurisdiction (AHJ) be consulted regarding local codes and installation procedures. Captive-Aire Systems is not responsible for obtaining necessary approvals and permits which may be required for installation, nor is it responsible for verifying that the unit has been installed in accordance with national, state, and local codes. In the absence of locally adopted codes use the current editions of the National Electrical Code and the Uniform Mechanical Code. Connections of the exhaust duct to the inlet and outlet of the C-ESP unit must be fully welded to comply with NFPA-96.

## INSTALLATION PRECAUTIONS

1. The services of qualified contractors are essential for safe and proper installation of this equipment.
2. The air volumes and external static pressures that are listed on the unit are for the middle of the operating range of the filters. The initial air volume should be at least 10% higher than the listed CFM. As the filters load up the air volume will drop. This is inherent to this type of unit. If the unit is set up at or below the design CFM, as the filters load up, the kitchen hood may experience smoke loss problems. Please consult the factory if you have questions.
3. The unit is designed for installation on a level surface.
4. When installed in an enclosed space a fire rated enclosure may be required for the unit and associated duct work. Consult the Authority Having Jurisdiction.
5. Consult the Authority Having Jurisdiction regarding requirements covering the point of termination of the exhaust outlet of this unit. Minimum distances must usually be maintained between the exhaust outlet and any outside air intakes and/or adjacent structures or property lines.
6. Do not apply power to the unit until all electrical connections have been made and a pre-start-up preliminary inspection has been completed.
7. Allow a minimum of 36 inches clearance in front of the filter access door and electrical compartment door for service and routine maintenance per NEC.

## SHORT TERM STORAGE

Units that include media bed odor control are provided with KOR48/carbon media which is shipped separate from the unit. KOR48/carbon media must be stored in a dry place with less than 95% relative humidity.

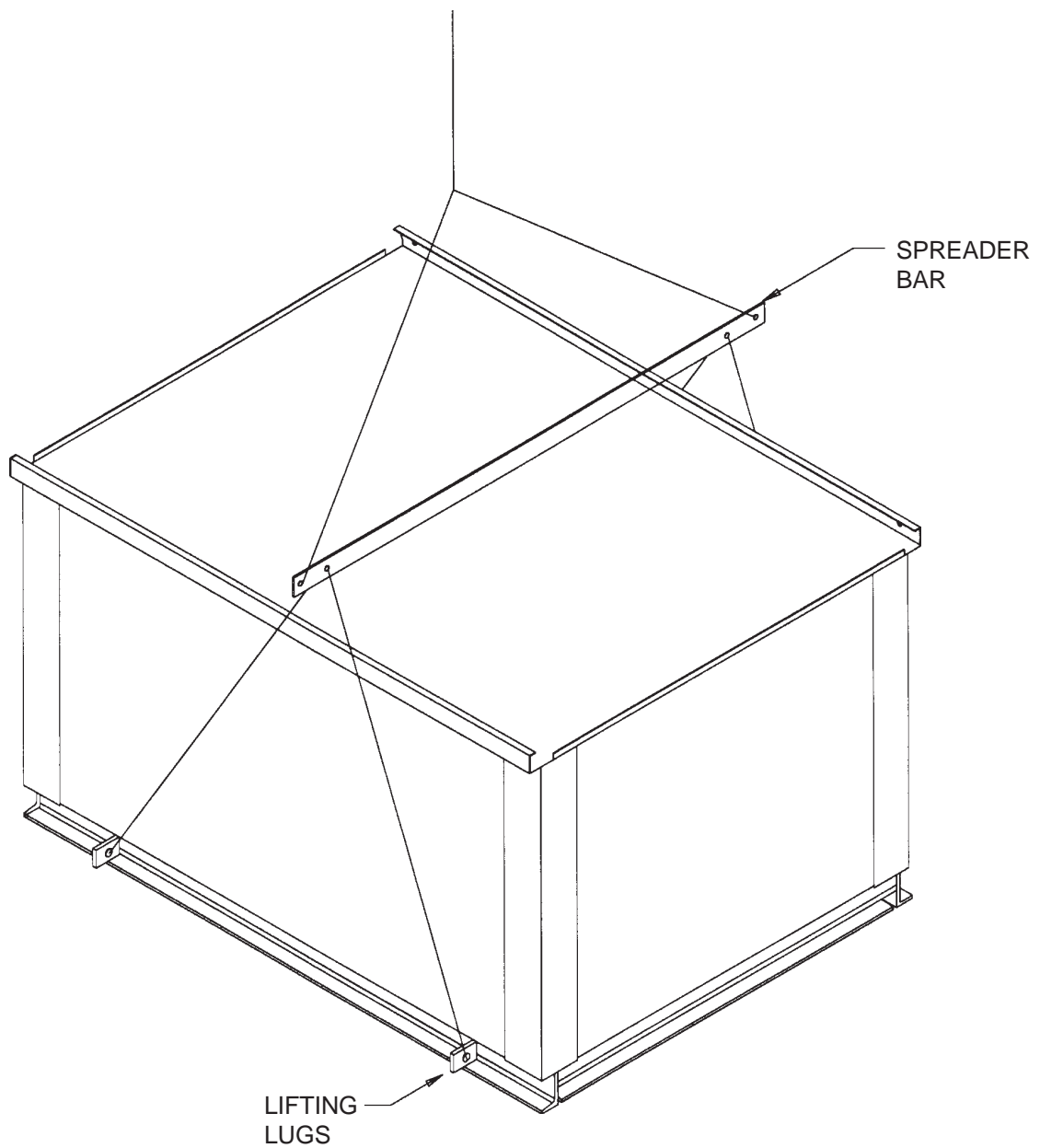
## EXHAUST FAN RECEIVING AND STORAGE

If the unit is equipped with an exhaust fan it must be re-lubricated as soon as it arrives. To prevent corrosion all bearings should receive grease and be rotated the first of every month. Rotate the wheel several revolutions every three to five days to keep a coating of grease on all internal bearing parts. Turn the wheel by hand while greasing bearings. A clean 1/16" bead of grease must appear on each side of each bearing. Refer to specific bearing lubricating instructions on the fan. Also, refer to bearing lubricating instructions found in the exhaust fan section of this manual.

Bearings which are to be stored or idle for an extended period of time should be wrapped in a neutral grease-proof paper, foil, or plastic film. Compounds can be recommended by the bearing manufacturer to provide protection for several months to several years.

After long-term storage, grease should be purged from the bearings and fresh grease injected prior to start-up.

# EQUIPMENT LIFTING PROCEDURE



1. All units are provided with a minimum of four lifting points for rigging attachment. All lifting points must be used.
2. Spreader bars are mandatory to prevent contact and damage to the unit by lifting hooks, straps, cables or chains.

# HOUSING ASSEMBLY INSTRUCTIONS

Typically, C-ESP units are shipped as one piece. Sometimes for building accessibility reasons a unit may be shipped in multiple pieces. If this is the case, refer to the instruction below and on page 15.

## 1. Attach "ESP Section" to "Media Bed Odor Control Section":

Bolt "Media Bed Odor Control Section" and "ESP Section" bases together on outside of unit, using 3/4" holes. Tek screw walls and roofs together, using 3/16" holes. Continuously weld: floor, wall, and roof seams from inside of unit.

## 2. Attach "Media Bed Odor Control Section" to "Plenum Section":

Bolt "Media Bed Odor Control Section" and "Plenum Section" bases together on outside, using 3/4" holes. From inside plenum, tek screw walls and roofs together, using 3/16" holes. Continuously weld: floor, wall, and roof seams from inside of unit.

## 3. Attach Fan Inlet to "Plenum Section" outlet:

Push "Exhaust Fan Section" about 7 inches from "Plenum Section". Tek screw & caulk fan duradyne to plenum interconnect ring, at 5 inch intervals (minimum). Duradyne is pre-attached to fan inlet side.

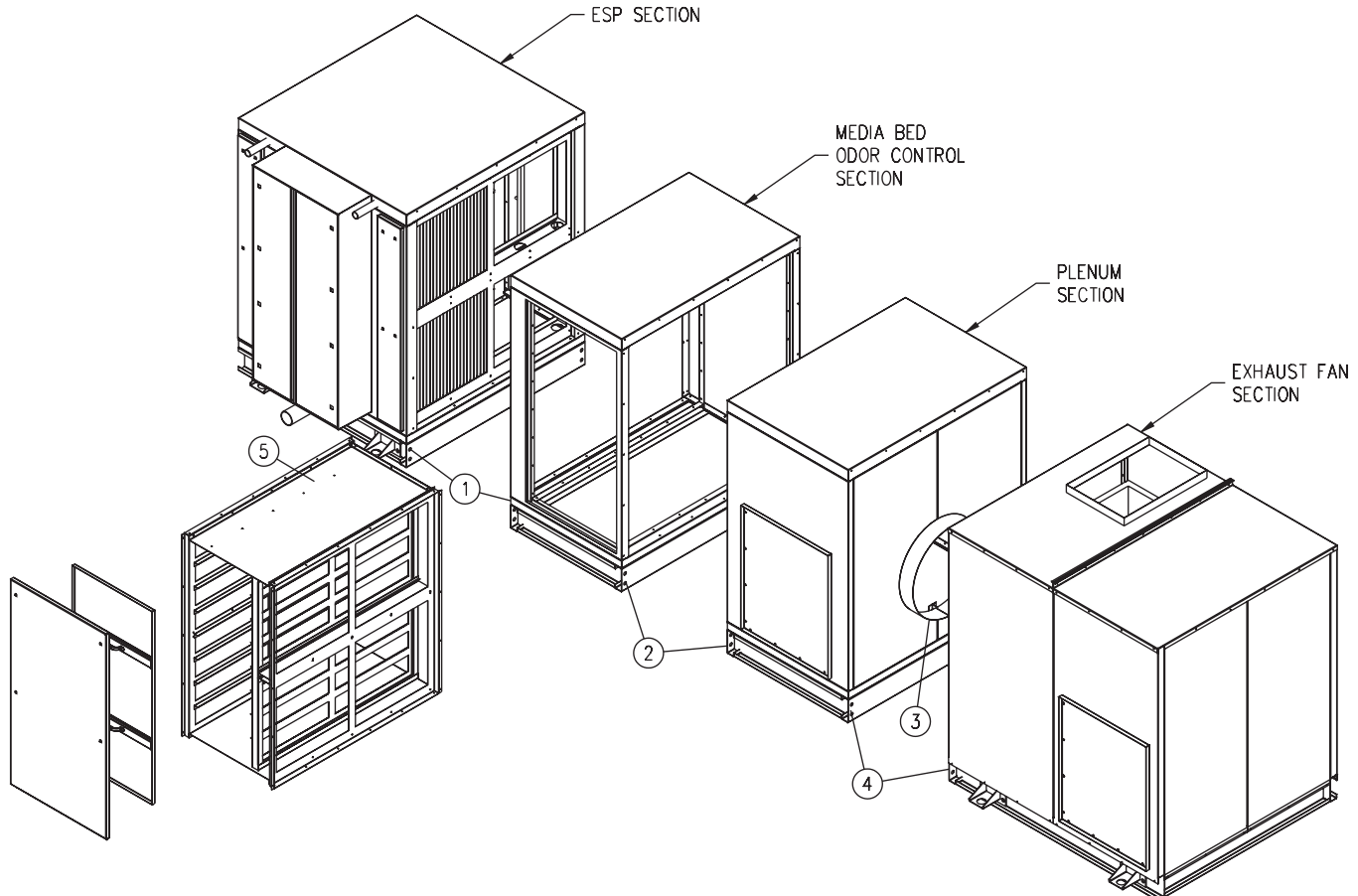
## 4. Attach "Plenum Section" to "Exhaust Fan Section":

Bolt "Plenum Section" and "Exhaust Fan Section" bases together on outside, using 3/4" holes. From inside of plenum, tek screw walls and roofs together, using 3/16" holes. Continuously weld floor seam from inside plenum. "Exhaust Fan Section" walls and roof to remain removable for exhaust fan replacement, tek screw and bolt only.

## 5. Assemble "Media Bed Odor Control Section":

Refer to "Media Bed Odor Control Section Assembly Instructions" drawing.

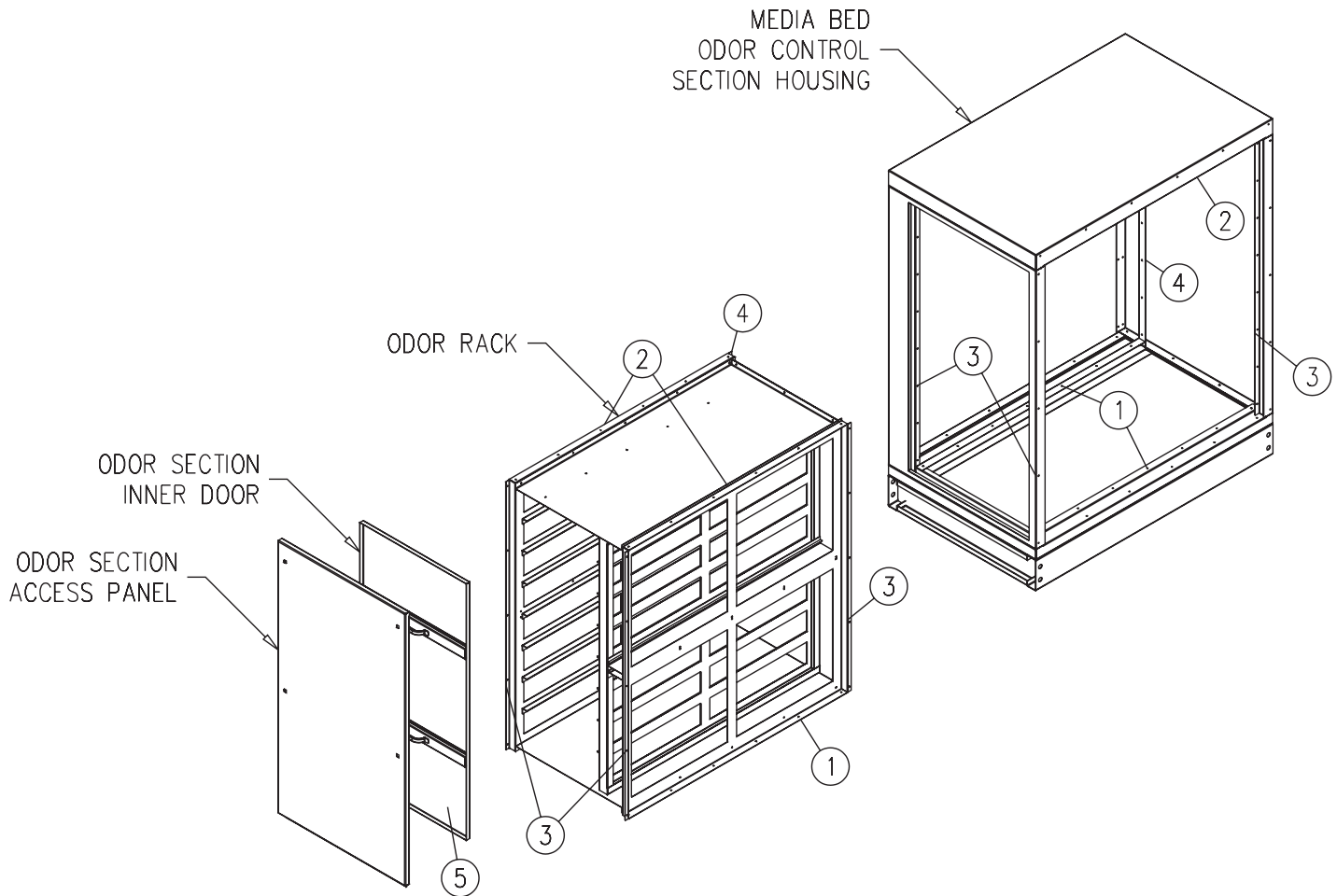
## 6. Reconnect Electrical to Exhaust Fan



# MEDIA BED ODOR CONTROL SECTION ASSEMBLY INSTRUCTIONS

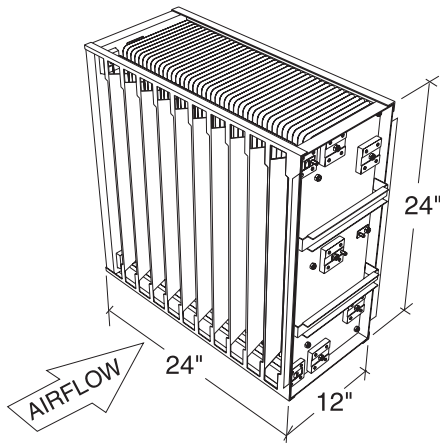
**NOTE: Assemble this section, only after the rest of the unit has been assembled.**

1. Slide odor rack into unit through door opening. Tek screw rack to floor rails, using 3/16" holes.
2. Tek screw upper rack to both sides of roof rails.
3. Tek screw first 3 sides to mouning rails from outside of the unit.
4. Attach fourth side by entering odor rack to reach screw holes.
5. Attach odor section inner door, flip latches to secure.

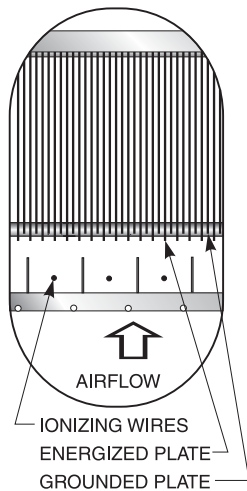


## Principle of Operation

The Captive-Aire Pollution Control Unit removes smoke particles by electrostatic precipitation. The principle of operation of electrostatic precipitation is actually quite basic. The electrostatic cell is made up of a series of aluminum plates spaced approximately 1/4" (6.35mm) apart and the number of cells used is determined by the air volume and the type of cooking equipment involved. Every other plate is energized with 5000 volts of D.C. power and the alternating plates are grounded. At the entry point of the cell is a series of thin wires spaced approximately 4" (101.60mm) apart. These wires, referred to as ionizing wires, are energized with 10,000 volts D.C. and as the smoke particles enter the cell and pass over the wires they receive a positive charge. As the charged particles continue through the cell, the positive plate repels them and the negative or grounded plate attracts them. Thus, the smoke particles are collected on the negative plates. The action is efficient, safe and simple.



**ISOMETRIC VIEW**



**SIDE VIEW  
ELECTROSTATIC CELL**

## Wash Cycle

All Captive-Aire units include, as standard equipment, an internal washdown system and control cabinet which when activated washes the unit with hot detergent injected water to remove the daily accumulation of smoke and grease particles. The washdown system and controls are interfaced with the Captive-Aire Water Wash Ventilator. There are two possible arrangements of controls for the operation of the Ventilator and the C-ESP Unit as illustrated on page 9. In the first arrangement, the Control Cabinet in the kitchen serves both the Ventilator and the C-ESP Unit. The hot water solenoid valves and detergent pump and container for both the Ventilator and C-ESP Unit are located in this cabinet. In the second arrangement there is a Control Cabinet for the ventilator electrically interfaced with a Sub Panel that serves the C-ESP Unit. The hot water solenoid valves and detergent pump for the C-ESP Unit are housed in the Sub Panel and the detergent container is located below or next to the panel. The detergent pump and container for the Ventilator are both housed in the main Control Cabinet located in the kitchen. In both arrangements the Exhaust Fan, ESP, Wash Cycles and Fire Cycle Functions are controlled by the Ventilator Control Cabinet. The difference between the two is the location of the plumbing components.

## Fire Cycle

In the event of a fire, a 250° F. thermostat, mounted in the airstream, will activate shutting off the exhaust fan and ESP cells, and turning on the water sprays within the C-ESP Unit. The fire cycle of the water wash ventilator will also activate at this time. The water will run continually until the thermostat cools below 250° F, and then run for another 2 minutes. At the conclusion of this cool down cycle the exhaust fan may be started by pushing "**Start Fan**".

## INTERNAL FIRE MODE

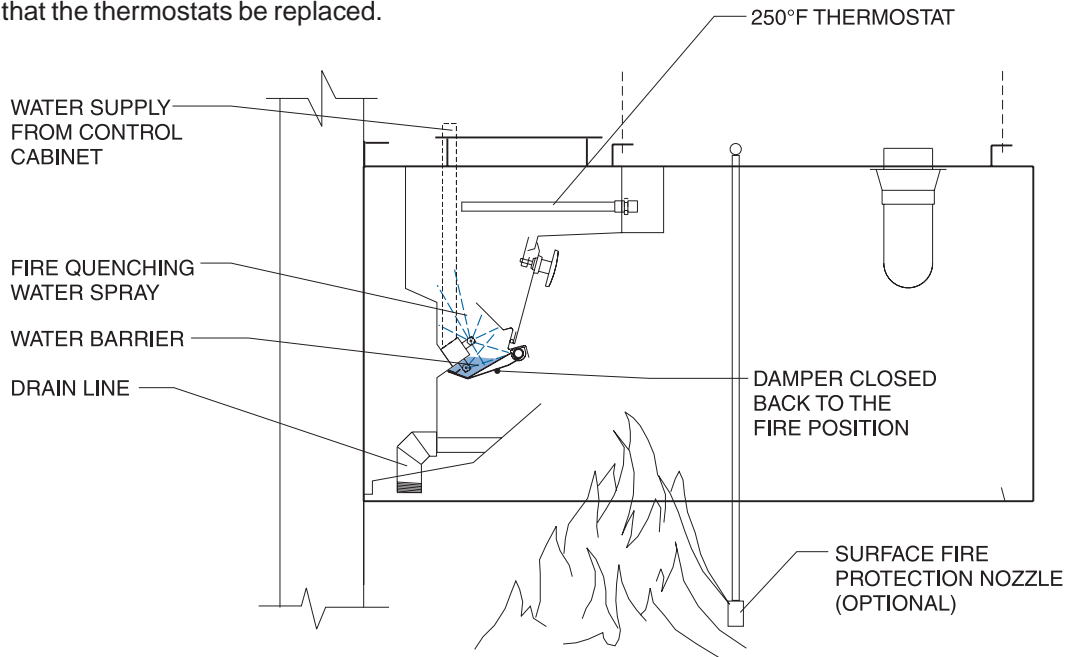
Automatic internal fire protection is accomplished by the action of the thermostat(s), which is located in the filter section of the C-ESP. When the temperature of the conveying airstream, which must pass over the thermostats, reaches 250°F, the system is activated, and the following occurs:

1. The damper begins closing back to the fire position, on a Captive-Aire Ventilator, if so equipped, position 3 as shown in Fig.4—stopping the combustion-supporting, natural draft through the ventilator and creating a fire barrier to contain the fire in the kitchen.
2. The exhaust fan is shut off. The supply fan is also shut off.
3. Fire-smothering water spray is released into the interior of the C-ESP through the spray nozzles.
4. The digital display reads "Fire In Hood, Fan Off, Wash On" for approximately 5 seconds.
5. Then the digital display reads "Fire In Hood, Damper Closing" for approximately 5 seconds.
6. Then the digital display reads "Fire In Hood, Notify Fire Department". This display stays on until the thermostat cools down below 250°F.
7. A red light on the Command Center illuminates.
8. If the Command Center is intertied with a building alarm or monitoring system, a fire signal would be sent to that system.
9. Upon cooling of the thermostat below 250°F, the Cool Down Cycle starts. The water continues to spray during the Cool Down Cycle (2 minutes). The damper moves to the exhaust position, on a Captive-Aire Ventilator, if so equipped.
10. While in the cool down cycle the digital display reads "Cool Down Cycle, xxx sec. to end". xxx is the count-down in seconds until the wash turns off.
11. At the end of the cool down cycle the water turns off and the digital display reads "Fan Off 12:00 (actual time), Start Fan>F1". The damper closes to the wash position in a Captive-Aire Ventilator, if so equipped.

**NOTE:** The water may be shut off prior to the end of the 2 minute cool down cycle by pushing the "Exit" button on the CGPC-6000 Command Center. After the water has shut off, the damper remains in the wash position on a Captive-Aire Ventilator, if so equipped, until the "Start Fan" button is pushed.

### CAUTION:

In case of severe fire the thermostats located in the filter section will activate. As a precautionary measure, it is recommended that the thermostats be replaced.



**FIRE CYCLE**

## Captive-Aire Ventilator



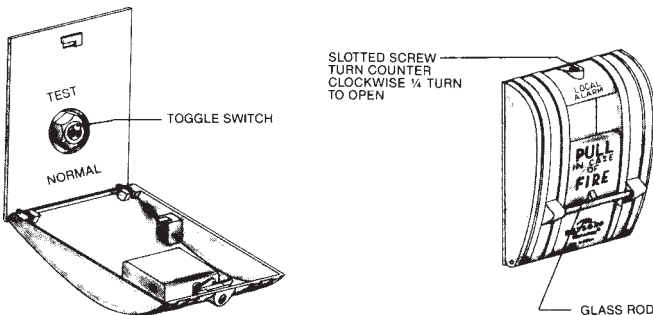
## EXTERNAL FIRE MODE

An External Fire Mode is activated by the Pollution Control Units or Ventilator's Fire Suppression (Duct, Plenum, Surface/Appliance) system's microswitch or contacts and/or an optional break glass fire switch (see Figure 5). Terminals 4 & FS are used for the External Fire Mode, refer to wiring diagram for details. The break glass fire switch, if used, would normally be located at the exit of the kitchen. When the External Fire Mode is activated, the following occurs:

1. The Exhaust Fan comes on immediately if it was off to help remove smoke, heat, etc.
2. The Supply Fan shuts off immediately.
3. The digital display reads "Ext.FireActive" and alternates between "Reset FireSwitch" and "Fan On, Wash On".
4. A red light on the Command Center flashes.
5. After a 60-second delay, a fire smothering water spray is released into the interior of the C-ESP and the Captive-Aire Ventilators, if so equipped, through the spray nozzles. The 60-second delay allows the C-ESP's and ventilator's fire suppression system time to put out the fire, before starting the water spray.

If the fire intensifies and the thermostat reaches 250°F, the fire damper would then close on a Captive-Aire Ventilator, if so equipped, and the exhaust fan would shut off. See Internal Fire Mode.

To resume normal operations, open the fire switch and flip the toggle switch to the position marked "normal". Replace the glass rod and close the cover. Push either the "Start Fan" or "Start Wash" button.



**FIG. 5**  
**BREAK GLASS FIRE SWITCH**  
**C-1357A SERIES**

## INTERNAL & EXTERNAL FIRE MODES AT THE SAME TIME

It is possible that both the Internal and External Fire modes can be activated at the same time. If this occurs, the Internal Fire Mode will override the External Fire mode until the thermostat(s) cool below 250°F. At this point the Cool Down Cycle will start counting down for 2 minutes. After the Cool Down Cycle, the External Fire mode will start.

Special Note: If the control is in the Cool Down Cycle when the External Fire mode is activated, the Cool Down Cycle will finish counting down for 2 minutes, before switching to the External Fire Mode.

## Summary of Both Fire Modes at the Same Time

1. Internal Fire Mode (until thermostat temperature drops below 250°F)
2. Cool Down Cycle (for 2 minutes)
3. External Fire Mode (until the External Fire Switch is reset)

## TESTING INTERNAL FIRE MODE

The internal fire protection system may be tested periodically by pushing and holding for 20 seconds, the "Fire Test Switch" located inside the electrical compartment of the control cabinet. Pushing this switch duplicates thermostatic action. **CAUTION: Before pushing the "Fire Test Switch", check to see if the internal fire protection system is tied to the building alarm system.**

## TO RESUME NORMAL OPERATION

1. To discontinue the 2 minute cool down cycle at any point during the cycle, push the "Exit" F5 button on the CGPC-6000 Command Center.
2. Push the "Start Fan" F1 button on the Command Center.

## SURFACE FIRE PROTECTION

The National Fire Protection Association, NFPA-96 document requires fire extinguishing equipment over all grease producing cooking equipment such as griddles, ranges, fryers, broilers, and woks. In addition, the system must protect the interior of the ventilator and the exhaust duct.

The most common fire system is a wet chemical type. In the event of a fire this system would normally be activated and discharged prior to the ventilator's internal fire protection. If the fire is unusually severe or the surface fire protection system malfunctions, the ventilator's internal fire protection system would activate, thus providing a second level of defense. These systems may be inerted with the ventilator control cabinet to activate the External Fire Mode.

## FIRE MODE SUMMARY:

Note: The Damper Position applies to a Captive-Aire Ventilator, if so equipped.

	INTERNAL FIRE	COOL DOWN CYCLE (for Internal Fire Mode only!)	EXTERNAL FIRE
Exhaust Fan	OFF	OFF	ON
Supply Fan	OFF	OFF	OFF
Damper Position	FIRE	EXHAUST	EXHAUST
Water Spray	ON	ON	ON

## DAILY OPERATION

All functions of the Captive-Aire Ventilator and C-ESP Unit, such as starting the exhaust fan, starting the wash cycle, etc., are controlled by the Command Center located on the control cabinet. Refer to Pages 21 through 25 for detailed instructions on the operation of the Command Center.



### Starting the Exhaust Fan

To start the exhaust fan and C-ESP Unit push the **“Start Fan”** button on the Command Center. If the Command Center is programmed to start the fan automatically, then the start button does not need to be pushed. It is important to start the exhaust fan before turning on the cooking equipment.

When the exhaust fan is activated the following occurs:

1. The damper on Captive-Aire's Ventilator begins opening to the exhaust position. (if applicable)
2. A green light on the Command Center illuminates.
3. The supply fan comes on.
4. The digital display reads "Starting Fan & Damper Opening" for approximately 5 seconds. Then the digital display reads "Starting Fan, xx Seconds to Fan On". xx is the countdown in seconds until the exhaust fan comes on.
5. After the damper fully opens (elapsed time approximately 45 seconds) the unit exhaust fan starts.
6. The digital display then reads "Fan On 12:00" (current time) and "Start Wash> F2".
7. The cell status light(s) will come on indicating that the ESP cells are operating.

### Stopping the Exhaust Fan and Starting the Wash Cycle

**CAUTION:** The cooking equipment must be shut off prior to shutting off the exhaust fan. Failure to do this will cause excessive heat buildup and could cause the surface fire protection system to discharge.

To start the wash cycle push the **“Start Wash”** button on the Command Center. If the Command Center is programmed to start the wash automatically, then the start button does not need to be pushed. When the wash cycle is activated the following occurs:

1. The exhaust and supply fans shut off.
2. The ESP cells shut off.
3. The damper begins closing forward to the wash position. This action takes approximately 45 seconds.
4. The digital display reads "Starting Wash, Damper Closing" for approximately 45 seconds, then the digital display reads "Starting Wash, Wash On in xx seconds". xx is the countdown in seconds to until the wash starts.

5. After the damper in the ventilator closes to the wash position, the hot detergent injected water sprays come on to wash away the grease collected during the day's operation. The wash cycle stays on for the length of time programmed in the Command Center. The length of the wash cycle may be set between 3 and 9 minutes. Typical settings for the Captive-Aire Ventilator are 3 minutes for light-duty equipment, 5 minutes for medium-duty equipment and 9 minutes for heavy-duty equipment. The typical setting for the C-ESP unit is 5 minutes. Refer to page 20 for details on setting the length of the wash.

6. During a Ventilator wash, the digital display reads "Hood Wash, Wash #1 xxx seconds." xxx is the countdown in seconds until this portion of the wash is completed.

7. During an ESP wash, the digital display reads:

"ESP Wash 1, Wash #2 xxx seconds"

"Hot Water Heating, Wash #2 xxx seconds"

"ESP Wash 2, Wash #2 xxx seconds."

"Hot Water Heating, Wash #2 xxx seconds"

"ESP Rinse, Wash #2 xxx seconds"

xxx is the countdown in seconds until this portion of the wash is completed.

8. The digital display now reads "Fan Off 12:00" (current time) and Start Fan>F1.

After the wash cycle is completed, wipe the exposed front surface of the damper at the air inlet slot, as well as other exposed exterior surfaces.

In very heavy cooking operations it may be necessary to wash the equipment more than once a day. This can be done manually by pushing the **“Start Wash”** button.

**NOTE:** For proper operation of the wash system there must be adequate water pressure and temperature. There is a pressure/temperature gauge inside the control cabinet.

Water Pressure 60 psi min. - 80 psi max.

Water temperature 160°F min. - 180°F max.

**NOTE:** Some control cabinets are equipped with a low detergent switch. If so equipped, the green light will flash if the detergent tank is empty or if the detergent pump is malfunctioning and detergent is not pumping. The digital display reads "Low Detergent" and the text alternates from "Fill Tank" and "Check Pump". If the detergent tank is filled with water the detergent switch will activate as if there is no detergent.

**NOTE:** The wash system is designed to remove daily accumulations of grease within the equipment. If the equipment is not washed a minimum of once during a cooking day, a grease buildup could accumulate which the wash system cannot remove. If this occurs, it is recommended that the equipment be put through several wash cycles by pushing the **“Start Wash”** button on the Command Center. If this does not remove the grease, it will be necessary to remove the grease manually by using a scraping tool, such as a putty knife, or retain the services of a commercial hood cleaning service to steam clean or pressure wash the system.

**WARNING:** Some commercial hood cleaning services blow a fire retardant chemical into hood and duct systems. Fire retardant chemicals should never be applied to any portion of The Captive-Aire Ventilator or ESP unit. If retardant is applied, it must be removed.

## Ventilator wash

The length of the ventilator wash is determined primarily by the cooking equipment involved. Set the wash length from 3 – 9 minutes for light, medium or heavy duty equipment as shown on the Recommended Ventilator Wash Time Chart on this page. Adequate cleaning of the Ventilator is dependent upon water pressure, water temperature, grease accumulation and hours of operation. It may be necessary to increase the wash cycle time above recommendations depending upon these conditions.

## C-ESP wash

The length of wash cycle time for the C-ESP Unit is normally set for 5 minutes as shown on the "Wash Cycle Sequence Charts". Set length of ESP washes to 5 minutes.

## Delay

The "Wash Delay" is used to set the delay time between each wash. A delay may be necessary to allow the hot water system to recover. The Wash Delay may be set from 1 – 99 minutes as required.

## Rinse cycle

A rinse cycle is a hot water wash only (no detergent), and occurs at various times during the wash cycle as shown on the "Wash Cycle Sequence Charts". The rinse cycle time is 3 minutes.

RECOMMENDED VENTILATOR WASH TIME CHART	
TYPE OF COOKING EQUIPMENT	RECOMMENDED WASH TIMES (MINUTES)
<b>LIGHT DUTY</b> .....	<b>3</b>
Ovens, steamers, and kettles	
<b>MEDIUM DUTY</b> .....	<b>5</b>
Braising pans/Tilting skillets, fryers, griddles, grooved griddles, open burner ranges, hot top ranges, and conveyor ovens	
<b>HEAVY DUTY</b> .....	<b>9</b>
Gas and electric char broilers, upright broilers, woks and conveyor broilers, Solid fuel broilers	

## WASH CYCLE SEQUENCE CHARTS

All ESP Washes include the following steps:	
1. ESP Wash 1	(3-9 minutes)
2. Delay	(1-99 minutes)
3. ESP Wash 2	(3-9 minutes)
4. Delay	(1-99 minutes)
5. ESP Rinse	(3 minutes)

### NOTES:

- \* ESP Wash 2 length = ESP Wash 1 length (always)
- \* ESP Rinse length = 3 minutes (always)
- \* Please note ALL "Delay" times are the same

All Hood Washes include the following:	
1. Hood Wash	(3-9 minutes)

Typical Wash Cycle for a Single Pass (1ESP) unit with 1 Wash manifold:	
1. ESP Wash 1	(5 minutes)
2. Delay	(1 minute)
3. ESP Wash 2	(5 minutes)
4. Delay	(1 minute)
5. ESP Rinse	(3 minutes)
<b>Total Elapsed Time:</b>	<b>15 minutes</b>

Typical Wash Cycle for a Single Pass (1ESP) unit with 2 Wash manifolds (DW):	
<u>Wash Manifold #1</u>	
1. ESP Wash 1	(5 minutes)
2. Delay	(1 minute)
3. ESP Wash 2	(5 minutes)
4. Delay	(1 minute)
5. ESP Rinse	(3 minutes)
6. Delay	(1 minute)
<u>Wash Manifold #2</u>	
7. ESP Wash 1	(5 minutes)
8. Delay	(1 minute)
9. ESP Wash 2	(5 minutes)
10. Delay	(1 minute)
11. ESP Rinse	(3 minutes)
<b>Total Elapsed Time:</b>	<b>31 minutes</b>

## General Description:

The CGPC-6000-ESP Command Center is designed to start and stop the exhaust fan and wash up to 5 groups of ventilators and a C-ESP unit in sequence with a delay period between each wash. A sequence wash may be necessary if the building's hot water system is not capable of supplying the required volume of water at one given time.

The exhaust fan and wash sequence may be started **Manually** by pushing the "Start Fan" or "Start Wash" buttons, or may be programmed for **Automatic** operation.

Programmed operations may include:

1. Starting the exhaust fan once within a 24-hour period.
2. Stopping the exhaust fan and starting the wash cycle sequence once within a 24-hour period.
3. Programming the length of the wash cycles and delay periods between the wash cycles. The maximum length of a wash cycle is 9 minutes. The maximum length of the delay period is 99 minutes.
4. Skipping a day so the exhaust fan and wash cycle do not operate for holidays or specific days within a 7-day week when the kitchen is not operating.

The CGPC-6000-ESP Command Center provides information and programming for various functions by accessing nine different menu categories. An overview of the nine menu items are as follows:

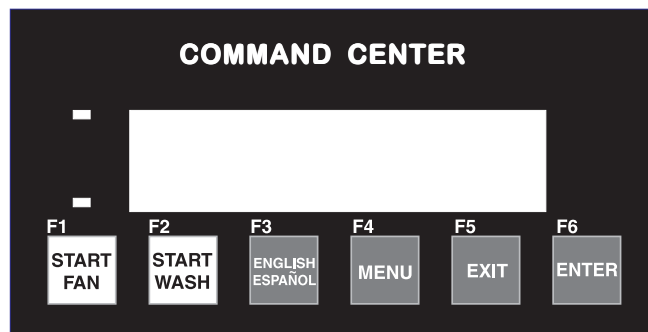
1. Cycle Type: Toggles each wash solenoid between a Hood wash and an ESP wash. Preset at factory and protected by a password.
2. Detergent: Displays Toll-Free Number to order detergent: 800-286-2010.
3. Wash Length: Sets length of each wash cycle from 3 to 9 minutes.
4. Delay Time (for sequence wash units only): Sets delay between washes from 1 minute to 99 minutes.
5. Set Clock: Day, hour and minutes.
6. AutoMode [M or A]: Sets the CGPC-6000-ESP to Manual or Automatic modes. In Automatic mode, the CGPC-6000-ESP will start the Fan and Wash at the preset times that were set using the Set Wash Times option.

A = Automatic / M = Manual

Also allows individual days (Mon, Tues., etc.) to be set ON or OFF when Automatic mode is selected.

7. Set Wash Times: Sets Start Times for Automatic start of Fan and wash when CGPC-6000-ESP is set to Automatic mode.
8. Wash Test: Runs through a complete Wash Cycle with decreased times.

Damper Closing Time = 10 sec.  
Wash Times = 10 sec.  
Water Heating Time = 10 sec.



MODEL CGPC-6000 COMMAND CENTER

**OPERATING INSTRUCTIONS**

1. Push "Start Fan" before turning on cooking equipment. Note: There is a 45 second delay after pushing the button before the fan starts to allow the damper to open to the "Exhaust" position.
2. At the end of the day, or whenever cooking is completed, push "Start Wash". This will turn off the exhaust fan and close the damper forward to the "Wash" position.
 

**Note:** There is a 45 second delay after pushing the button before the wash cycle starts, to allow the damper, if so equipped, to close to the "Wash" position. After closing, the timed wash cycle begins. Damper stays closed until "Start Fan" is pushed. Note: 24 hour kitchens must push "Start Wash" at least once a day, or as needed for proper cleaning.
3. To set the length of the time for the wash cycle, press "Menu", then press [F1] until "Wash Length" appears on the display. Follow the instructions on the display to edit the length of washes as necessary.
 

Note: Refer to the programming instructions on the inside of this cabinet for more information on programming the CGPC-6000 Command Center.

**LOW DETERGENT**

The green light will flash and "Low Detergent" will be displayed on the CGPC-6000 Command Center indicating the detergent is low.

**FIRE CONDITION**

1. A flashing red light and the message "Ext. Fire Active" indicates the control is in an External Fire Mode - exhaust fan on, damper open, and water wash nozzles on.
2. A continuous red light and the message "Fire In Hood" indicates the control is in an Internal Fire Mode - exhaust fan off, damper closed, and water wash nozzles on.

## CGPC-6000-ESP COMMAND CENTER

Exits menu when finished.

9. Number of Washes: Preset at factory and protected with a password.

Allows the number of washes to be changed from 1 to 13 (S1 to S13).

## Spanish (Español) Instructions:

The CGPC-6000-ESP Command Center has the ability to display its commands and messages in either English or Spanish (Español).

Press the "**ENGLISH / ESPAÑOL**" [F3] button to toggle the language displayed from English to Spanish (Español) or from Spanish (Español) to English.

NOTE: All messages displayed by pressing the "**MENU**" [F4] button only appear in English. They will not appear in Spanish (Español).

## Using the Menu:

To Enter the Menu, press the **MENU** button [F4].

To navigate the Menu:

- Press [F1] to go to the Next menu item
- Press [F2] to go to the Previous menu item
- Press [F5], the **EXIT** button to exit the Menu
- Press [F6], the **ENTER** button to select a Menu item

## 1. Cycle Type

- Pressing [F6] **ENTER** will prompt for a password. It is not necessary to change these settings. They are preset at the factory.

## 2. Detergent

- Pressing [F6] **ENTER** will prompt for a password. It is not necessary to change these settings. They are present at the factory.

## 3. Wash Length

- Press [F6] **ENTER** to display the Length of Wash #1
- Press [F3] to Increase the Wash Time up to 9 Minutes (Maximum)
- Press [F4] to Decrease the Wash Time down to 3 Minutes (Minimum)
- Press [F1] to adjust the Length of Wash #2 (if applicable)
- Press [F5] **EXIT** to return to the menu
- Note: Press [F1] to advance through all washes (ex. "-S2" has 2 washes)

## 4. Delay Time

- Press [F6] **ENTER** to display the Delay Time between washes (Not used if there is only one wash)
- Press [F3] to Increase the Delay Time up to 99 Minutes (Maximum)
- Press [F4] to Decrease the Delay Time down to 1 Minute (Minimum)
- Press [F5] **EXIT** to return to the menu

## 5. Set Clock

- Press [F6] **ENTER** to display the current Day of the Week (1=Sunday)
- Press [F3] to change to the next Day of the Week (1=Sun, 2=Mon, 3=Tues, etc.), keep pressing [F3] to cycle around if necessary
- Press [F1] to go to the current Hour
- Press [F3] to increase the Hour, keep pressing [F3] to cycle around if necessary

- Press [F1] to go to the current Minute
- Press [F3] to increase the Minute, keep pressing [F3] to cycle around if necessary
- Press [F5] **EXIT** to return to the menu

## 6. AutoMode [A or M]

- Used to select [M]annual or [A]utomatic mode. If [A] is displayed, the CGPC-6000-ESP is set to operate in Automatic mode. If [M] is displayed, the CGPC-6000-ESP is set to operate in Manual mode.
- Press [F6] **ENTER** to display the "Set Mode" screen
- Press [F6] **ENTER** again to toggle between [M]annual or [A]utomatic mode

Setting Which Days of the Week to Run:

- Press [F1] to select which days to run the CGPC-6000-ESP in Automatic mode
- "Sun ON" or "Sun OFF" will display
- Press [F3] to set a day to "ON". Set a day to "ON" in order for the CGPC-6000-ESP to run on that day
- Press [F4] to set a day to "OFF". Set a day to "OFF" in order for the CGPC-6000-ESP NOT to run on that day
- Press [F1] to cycle through each day of the week [Sun – Sat.]
- Press [F5] **EXIT** to return to the menu

## 7. Set WashTimes

- Only used when CGPC-6000-ESP is set to Automatic mode
- Press [F6] **ENTER** to display the Start time for the Fan on Sunday (**Sun. Fan**)
- Press [F3] to increase the Hour
- Press [F4] to increase the Minutes
- Press [F1] to go to the Start time for the Wash on Sunday (**Sun.Wash**)
- Set the time, using the same method described above
- Press [F1] to cycle through for each day of the week, for the Start Times for the Fan and Wash
- Press [F5] **EXIT** to return to the menu

## 8. Wash Test

- Press [F6] **ENTER** to run the CGPC-6000-ESP through a complete Wash cycle with decreased times
- After the Wash Test is complete, the CGPC-6000-ESP will return to the Fan Off mode

## 9. Number of Washes

- Pressing [F6] **ENTER** will prompt for a password. It is not necessary to change this value. It is preset at the Factory.

# MODEL CGPC-6000-ESP SERIES MENU FUNCTIONS

MENU FUNCTION	DISPLAY READS
<p><b>1. Cycle Type</b> - Pressing [F6] [ENTER] will prompt for a password. It is not necessary to change these settings. They are preset at the factory. Press [F1] until "(1) Cycle Type" appears Press [F5] [EXIT] to return to the menu</p>	<p>(1) Cycle Type F1&gt;Next F2&gt;Prev (Toggles with) F5&gt;Exit F6&gt;Enter</p>
<p><b>2. Detergent</b> - To obtain phone number of G-510 Press [F1] until "(2) Detergent" appears Press [F6] [ENTER] to display the Phone Number to order Detergent: 1-800-286-2010 Press [F5] [EXIT] to return to the menu</p>	<p>(2) Detergent F1&gt;Next F2&gt;Prev (Toggles with) F5&gt;Exit F6&gt;Enter For Detergent: 1-800-286-2010 (Toggles with) F5&gt;Exit</p>
<p><b>3. To Set Wash Length</b> Press [F1] until "(3) Wash Length" appears</p>	<p>(3) Wash Length F1&gt;Next F2&gt;Prev (Toggles with) F5&gt;Exit F6&gt;Enter</p>
<p>Press [F6] [ENTER] to display the Length of Wash #1</p>	<p>Wash1 Time: 3MIN (Range from 3 Min. to 9 Min.)</p>
<p>Press [F3] to Increase the Wash Time up to 9 Minutes (Maximum) or Press [F4] to Decrease the Wash Time down to 3 Minutes (Minimum)</p>	<p>F3&gt;Up F4&gt;Down (Toggles with) F1&gt;Next F5&gt;Exit  * Pressing F1&gt;Next goes to Next Wash #2, etc. if control is set up as a Sequential control</p>
<p>Press [F1] to adjust the Length of Wash #2 (if applicable)</p>	
<p>Press [F5] [EXIT] to return to the menu</p>	
<p><b>4. To Set Delay Time</b> Press [F1] until "(4) Delay Time" appears</p>	<p>(4) Delay Time F1&gt;Next F2&gt;Prev (Toggles with) F5&gt;Exit F6&gt;Enter</p>
<p>Press [F6] [ENTER] to display the Delay Time between washes (Not used if there is only one wash)</p>	<p>Delay Time: 1Min (Range from 1 Min. to 99 Min.)</p>
<p>Press [F3] to Increase the Delay Time up to 99 Minutes (Maximum) or Press [F4] to Decrease the Delay Time down to 1 Minute (Minimum)</p>	<p>F3&gt;Up F4&gt;Down (Toggles with) F5&gt;Exit</p>
<p>Press [F5] [EXIT] to return to the menu</p>	
<p><b>5. To Set Clock</b> Press [F1] until "(5)Set Clock" appears</p>	<p>(5) Set Clock F1&gt;Next F2&gt;Prev (Toggles with) F5&gt;Exit F6&gt;Enter</p>
<p>Press [F6] [ENTER] to display the current Day of the Week (1=Sunday)</p>	<p>Day 6 1=Sunday F3&gt;Up F5&gt;Exit (Toggles with) F1&gt;Next F2&gt;Prev</p>
<p>Press [F3] to change to the next Day of the Week (1=Sun, 2=Mon, 3=Tues, etc.), keep pressing [F3] to cycle around if necessary</p>	
<p>Press [F1] to go to the current Hour</p>	<p>Hour: 7</p>
<p>Press [F3] to increase the Hour, keep pressing [F3] to cycle around if necessary</p>	<p>F3&gt;Up F5&gt;Exit (Toggles with) F1&gt;Next F2&gt;Prev</p>
<p>Press [F5] [EXIT] to return to the menu</p>	

## MODEL CGPC-6000-ESP SERIES MENU FUNCTIONS

MENU FUNCTION	DISPLAY READS
<p><b>6. AutoMode [A or M]</b> - Used to select [M]anual or [A]utomatic mode. If [A] is displayed, the C-6000 is set to operate in Automatic mode. If [M] is displayed, the C-6000 is set to operate in Manual mode. Press [F1] until "(6) Auto Mode" appears</p>	<p>(6) AutoMode [M] F1&gt;Next F2&gt;Prev (Toggles with) F5&gt;Exit F6&gt;Enter</p>
<p>Press [F6] <b>[ENTER]</b> to display the "Set Mode" screen</p>	<p>Set Mode [M] (Can be either "M" for Manual or "A" for Automatic)</p>
<p>Press [F6] <b>[ENTER]</b> again to toggle between [M]anual or [A]utomatic mode</p>	<p>F6&gt;[A]uto/[M]an (Toggles with) F1&gt;Next F5&gt;Exit</p>
<p><b>Setting which day of the week to run</b></p>	
<p>Press [F1] to select which days to run the C-6000 in Automatic mode "Sun ON" or "Sun OFF" will display</p>	
<p>Press [F3] to set a day to "ON". Set a day to "ON" in order for the C-6000 to run on that day Press [F4] to set a day to "OFF". Set a day to "OFF" in order for the C-6000 NOT to run on that day</p>	
<p>Press [F1] to cycle through each day of the week [Sun – Sat.]</p>	
<p>Press [F5] <b>[EXIT]</b> to return to the menu</p>	
<p><b>7. Set Wash Times</b> - Used only when C-6000 is set to Automatic mode. Press [F1] until "(7) Set Wash Time" appears</p>	<p>(7) SetWashTimes F1&gt;Next F2&gt;Prev (Toggles with) F5&gt;Exit F6&gt;Enter</p>
<p>Press [F6] <b>[ENTER]</b> to display the Start time for the Fan on Sunday (<b>Sun. Fan</b>)</p>	<p>Sun. Fan [14:24]</p>
<p>Press [F3] to increase the Hour Press [F4] to increase the Minutes</p>	<p>F3&gt;Hour F4&gt;Min. (Toggles with) F1&gt;Next F5&gt;Exit</p>
<p>Press [F1] to go to the Start time for the Wash on Sunday (<b>Sun.Wash</b>) Set the time, using the same method described above</p>	<p>Sun.Wash [14:24]</p>
<p>Press [F1] to cycle through for each day of the week, for the Start Times for the Fan and Wash</p>	<p>F3&gt;Hour F4&gt;Min. (Toggles with) F1&gt;Next F5&gt;Exit * Pressing <b>F1&gt;Next</b> - goes to Next Start Fan time, etc</p>
<p>Press [F5] <b>[EXIT]</b> to return to the menu</p>	
<p><b>8. Wash Test</b> Press [F1] until "(8) Wash Test" appears</p>	<p>(8) Wash Test F1&gt;Next F2&gt;Prev (Toggles with) F5&gt;Exit F6&gt;Enter</p>
<p>Press [F6] <b>[ENTER]</b> to run the C-6000 through a complete Wash cycle with decreased times</p>	<p>* Pressing <b>F6&gt;Enter</b> - Starts the Wash Test</p>
<p><b>9. Set Number of Washes</b> Press [F1] until "(9) # of Washes" appears</p>	<p>(9) # of Washes F1&gt;Next F2&gt;Prev (Toggles with) F5&gt;Exit F6&gt;Enter</p>
<p>Press [F5] <b>[EXIT]</b> to return to the menu</p>	

## TIME CLOCK OPERATION

AutoMode is used to have CGPC-6000-ESP start the exhaust/supply fans automatically, once per day. The AutoMode also stops the fans and starts the wash cycle, once per day.

### To use the AutoMode:

1. Set Wash Length(s) (Menu item #3)  
Set length of each wash cycle, from 3 minutes to 9 minutes
2. Set Delay Time between washes, if control has more than one wash solenoid (Menu item #4)  
Set amount of time to wait between washes, from 1 minute to 99 minutes
3. Set Clock (Menu item #5)  
Please note that the clock is a 24-hour clock.  
Example: 1:00 PM = 13:00  
Set the current day of the week.  
Example: 1 = Sun. 2 = Mon. 3 = Tues, etc.
4. Turn AutoMode ON (Menu item #6)  
Pressing (F6) Enter will toggle between [A]utomatic and [M]anual modes

After it is set to [A]utomatic mode, set which days of the week the Exhaust/Supply Fan will run - setting a day to "ON" means the Exhaust/Supply Fan will start on that day, and the Wash will run.

Example: Sun ON  
Mon OFF  
Tues ON

5. Set Wash Times, set start times for Fans & Wash (Menu item #7).

Set the time for the Fans to Start for each day of the week.

Example: Sun.Fan 5:00  
Mon.Fan 5:00

Set the time for the Wash to Start for each day of the week.

Example: Sun.Wash 22:00  
Mon.Wash 22:00



# DETERGENT PUMP OPERATION

The Captive-Aire Ventilator detergent pump is an integral part of the wash-down system of The Captive-Aire Ventilator and C-ESP unit. The pump is located within the control cabinet unless otherwise specified. (Refer to schematics on Pages 46 through 47.)

## OPERATION

The detergent pump is started when the wash cycle begins. The pump draws detergent up from the detergent tank, pushing it through the copper tubing and into the hot water line serving the ventilator.

**NOTE:** Some control cabinets are equipped with a low detergent switch. If so equipped, the green light will flash if the detergent tank is empty or if the detergent pump is malfunctioning and detergent is not pumping. The digital display reads "Low Detergent" and the text alternates from "Fill Tank" and "Check Pump". If the detergent tank is filled with water the detergent switch will activate as if there is no detergent.

## Initial Operation

To prime and operate the pump for the first time, it is recommended that water be used instead of detergent to prevent detergent from spilling in case of leaks at the system's fittings.

## Priming The Pump

The detergent pump is self-priming. Push the pump test switch, located on the junction box of the motor, and hold down until liquid climbs up the vinyl tubing and fills the pump head. The pump will be operating properly when both upper and lower poppet checks can be seen moving up and down slightly. If the pump does not self-prime, an air lock may have developed within the pump head and the following action should be taken:

1. Hold down pump test switch and loosen top cap slightly to allow air to be pushed out. Repeat as necessary until liquid climbs up tube and fills pump head.

**Note:** Do not over tighten cap or damage to the pump head will occur.

2. If the pump still does not work properly, check the following:

- A. Foot valve should be clean and immersed in the liquid.
- B. Check all fittings to ensure an airtight system.
- C. Poppet checks within the foot valve, pump head and brass check valve should be clean and operating freely.
- D. Detergent lines should be free and clear.

## DETERGENT FLOW

Detergent flow is initially factory set according to the pipe size of the control cabinet (refer to Detergent Consumption chart). Generally, the factory setting will be sufficient to provide adequate cleaning of the ventilator. However, adequate cleaning is dependent upon a number of factors:

- 1. Temperature of hot water
- 2. Water pressure cycle
- 3. Daily grease accumulation
- 4. Wash cycle time
- 5. Frequency of wash cycle
- 6. Type of detergent

Depending upon these factors, it may be necessary to adjust the detergent flow. Adjustment may be accomplished by changing the cam to a different size. To change the cam:

1. Loosen Allen set screw on brass cam.
2. Remove cam and replace with next size as required.
3. Cam #1 minimum setting. Cam #4 maximum setting.

**NOTE:** Cams are available from Captive-Aire Systems or your Certified Service Agency.

## PREVENTIVE MAINTENANCE

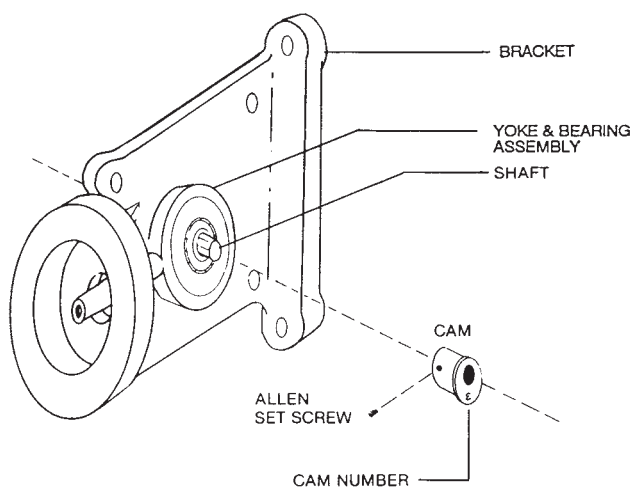
As with any piece of fine equipment, a reasonable amount of care must be taken to keep it in good working order:

1. Caution should be taken not to spill detergent on the exterior of the pump.
2. A periodic check should be made of all fittings to guarantee their tightness.

**NOTE:** The detergent pump motor has sealed bearings and will not require lubrication.

**DETERGENT CONSUMPTION CHART  
(Imperial)**

Control Cabinet Pipe Size	Factory Cam Setting	Oz. Per Min. at 40 PSI Water Pressure	WASH CYCLE LENGTH					
			3 Minutes		5 Minutes		9 Minutes	
			Oz. Per Day	Gal. Per Mo.	Oz. Per Day	Gal. Per Mo.	Oz. Per Day	Gal. Per Mo.
1/2"	#1	3.2	9.6	2.1	16.1	3.5	22.5	4.9
3/4"	#2	5.1	15.6	3.4	26.1	5.7	36.5	7.9
1"	#3	6.0	17.8	3.9	29.6	6.5	41.4	9.1
1 1/4" & 1 1/2"	#4	6.3	18.8	4.1	31.3	6.8	43.8	9.6



FORMULA G-510 is the only cleaner recommended by Captive-Aire Systems for use in the washdown system of The Captive-Aire Ventilator. FORMULA G-510 is a concentrated colloid cleaner specially formulated to remove the daily accumulation of grease inside The Captive-Aire Ventilator without damaging the rubber and synthetic parts of the detergent pumping system. FORMULA G-510 is biodegradable, safe for kitchen personnel, and has a variety of uses.

## DILUTION OF FORMULA G-510 FOR VENTILATOR CLEANING

### Normal Cleaning

For ventilators covering cooking equipment such as broilers, griddles, fryers, or any other heavy grease producing equipment, fill the detergent tank with full strength FORMULA G-510.

### Light-Duty Cleaning

For ventilators covering light grease producing equipment such as ovens, kettles, steamers and ranges, fill the detergent tank with a mixture of one part FORMULA G-510 to one part water.

### Cleaning the Ventilator Exterior

Mix one part FORMULA G-510 to twenty parts water in hand spray bottle. Spray on and wipe off. **NOTE:** Once a day, this same solution should be used to clean the front of the fire damper and main grease extracting baffle.

### FOR OTHER CLEANING JOBS

The colloidal action of FORMULA G-510 makes it a cleaner especially well-suited for use in kitchens. The colloids break up dirt and grease into millions of tiny particles that constantly repel each other. These particles cannot recombine or redeposit on a surface and are, therefore, easily washed away. FORMULA G-510 is biodegradable and contains no harsh chemicals, yet offers outstanding performance on the toughest cleaning jobs.

Use a mixture of one part FORMULA G-510 to twenty parts water for:

VINYL/PLASTIC/WALLS...Removes dirt, grease, food deposits and fingerprints.

REFRIGERATORS...Removes dirt, spilled milk, blood, mildew and objectionable odors.

RESTROOMS...Add a disinfectant to clean all fixtures, walls, floors, etc.

Use a mixture of one part FORMULA G-510 to five parts water for extremely heavy grease build-up, such as on the floor and on equipment around deep-fryers. Spray on and rinse or wipe off. For extremely soiled areas, gentle agitation, followed by a soaking period, will result in more thorough cleaning.

DON'T be afraid to experiment with FORMULA G-510 because it contains no phosphates, nitrates, enzymes, sulfates, sulfonates or silicates.

## LIMITED WARRANTY

G-510 CHEMICAL DIVISION warrants that FORMULA G-510 will not cause cleansing agent damage to the rubber and synthetic parts of the injection pump ("O" rings, diaphragms, washers, tubing, and other such parts) used with The Captive-Aire Ventilator, Heat Reclaim Unit, or Pollution Control Equipment. G-510 CHEMICAL DIVISION'S obligation under this warranty and any warranties implied by law shall be limited to repairing or replacing, at its option, any of said parts which G-510 CHEMICAL DIVISION'S examination shall disclose to its satisfaction to have been damaged by the use of FORMULA G-510 for the life of the detergent pumping system. This warranty shall not cover damages caused by any other detergent. The use of any other detergent shall void this warranty.

All repairs and replacement parts under this warranty shall be F.O.B. G-510 CHEMICAL DIVISION'S factory. The owner shall pay the necessary freight and delivery charges; also removal and installation costs. Any federal, state or local taxes are also extra. Requests for repairs or replacement parts should be made to 20/10 Products Inc., PO Box 7609, Salem, OR 97303.

This is the sole warranty with respect to FORMULA G-510. G-510 CHEMICAL DIVISION MAKES NO OTHER WARRANTY OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEED THE AFORESAID OBLIGATION ARE HEREBY DISCLAIMED AND EXCLUDED FROM THIS AGREEMENT. G-510 CHEMICAL DIVISION SHALL NOT BE RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM A BREACH OF THIS WARRANTY.

## IMPORTANT

If a cleansing agent other than FORMULA G-510 is used with The Captive-Aire Ventilator injection pump, it is recommended that a warranty similar to the above be obtained from the manufacturer of said product.

For name and address of the nearest FORMULA G-510 distributor contact:

**20/10 Products Inc.**  
**P.O. Box 7609**  
**Salem, OR 97303**  
**Phone: 800-286-2010**  
**FAX: 503-363-4296**  
**E-Mail: twentyten@juno.com**

Proper maintenance is the key element in keeping the Captive-Aire Unit operating at design efficiency. The following outlines recommended maintenance.

## CELL ROTATION

To achieve maximum smoke removal it is recommended that the ESP cells within the unit be rotated out, using spare cells provided. A soak tank (optional, refer to illustration on page 31) is recommended for each spare cell (optional) to facilitate cleaning. The frequency of rotation is based primarily on the type of cooking equipment the unit is serving and also on the number of hours per day of operation, hot water temperature and pressure, and the type of detergent used. The recommended cell rotation frequency is shown in the chart at right.

The number of ESP cells a unit has is dictated by the air volume (CFM) of the unit. The illustrations on page 30 shows the standard cell configurations from a one cell to a 16 cell unit. There are two types of cells, "Outer cells" and "Inner cells" marked "O" and "I" on the cell configuration illustrations on page 30 and marked on the nameplate of the cell shown on page 48. The differences between the two are shown on the illustrations on page 29. The number of "Inner" and "Outer" (optional) spare cells provided varies with the size of the unit. Refer to the spare cell chart on page 31.

**NOTE:** Some units are equipped with a second row of ESP cells, referred to as double pass and denoted in the model number by the suffix "2ESP". Refer to the cross section illustration on page 30 for an example. Additional spare cells are not provided for double pass units as the second pass does not get as dirty as the first pass.

In order to have effective cell rotation, it is important to set up a system so that you know which cell is next to be rotated out. Referring to the cell configuration illustration on page 30, a number has been assigned to each cell space. Use these numbers in developing a system for rotation.

## CELL ROTATION PROCEDURE

1. Remove the spare cell from the soak tank and drain the water. It may be necessary to hose the tank interior to remove grease and smoke residue.
2. Open the electrical compartment and cell access doors. Power will automatically disconnect and de-energize the cells.
3. Remove the three (3) wires from the outer cell by pulling forward from the cell terminals. Push the wire connectors onto holding terminals.
4. Pull the cell straight out slowly.

**CAUTION:** Each cell weighs 53 lbs. and may be awkward to handle, particularly cells in the upper racks. It is highly recommended that a heavy duty steel wheeled ladder be used in removing the upper cells. Extreme care must be taken to avoid damaging the cell. Do not grip or push on the cell plates or the ionizer wires.

**ESP CELL SUGGESTED ROTATION FREQUENCY CHART**

TYPE OF COOKING EQUIPMENT	ROTATION FREQUENCY IN DAYS
<b>LIGHT DUTY</b> ..... Ovens, steamers, and kettles	<b>30</b>
<b>MEDIUM DUTY</b> ..... Braising pans/Tilting skillets, fryers, griddles, grooved griddles, open burner ranges, hot top ranges, and conveyor ovens	<b>21</b>
<b>HEAVY DUTY</b> ..... Gas and electric char broilers, upright broilers, woks and conveyor broilers	<b>14</b>
<b>EXTRA HEAVY DUTY</b> ..... Solid fuel broilers	<b>7</b>

5. After the appropriate cells have been removed, replace them with clean cells taken from the soak tank. **Caution** - Be sure to replace the cell with the airflow pointing in the same direction of airflow as marked on the front of the cell access door.
6. Re-connect the 3 lead wires to the terminals on the cell. Close the cell and electrical compartment doors.
7. Place the dirty cells in the soak tanks. Fill with hot water and add Formula G-510 at a ratio of one part detergent to ten parts water. Leave the cell in the tank until the next rotation.

## WEEKLY MAINTENANCE

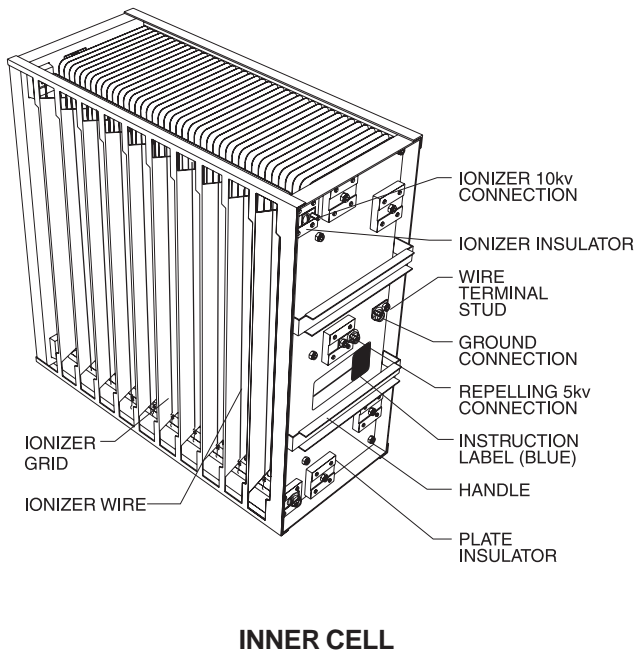
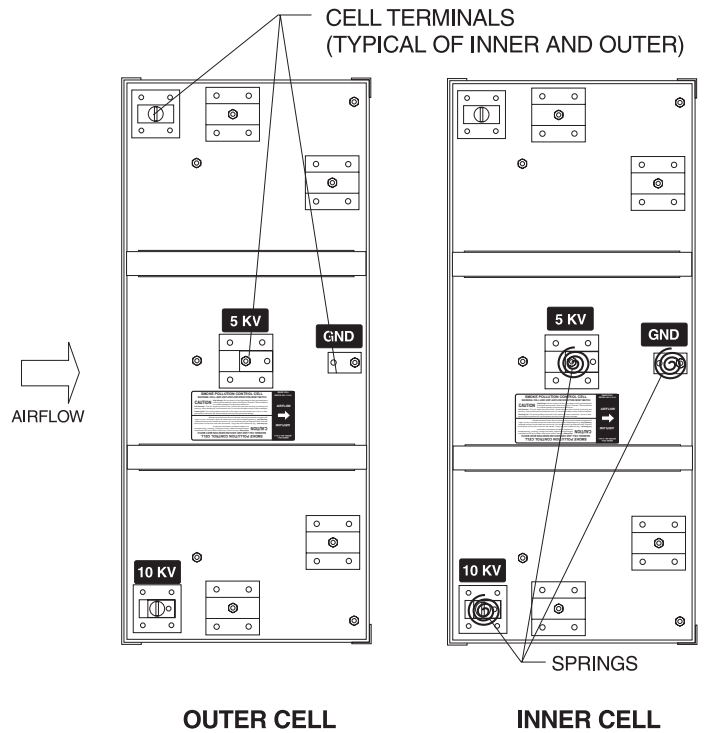
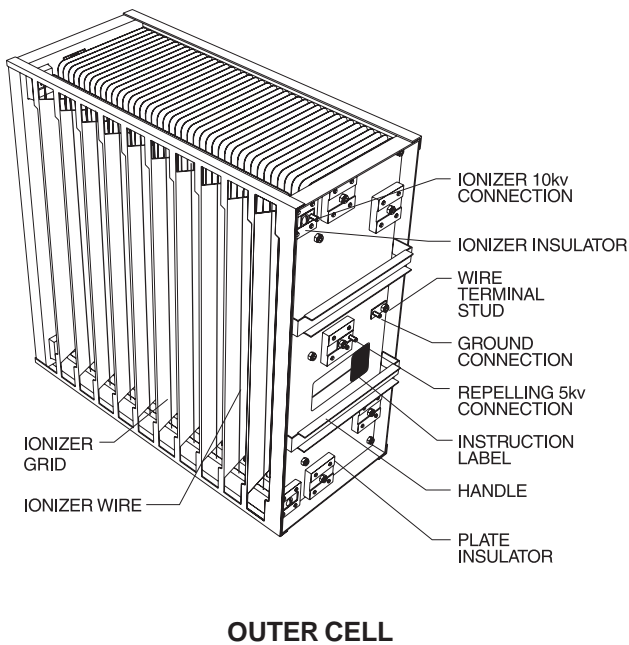
The detergent tank should be checked at least weekly and filled with recommended detergent. (Refer to page 27.) The Control Cabinet may be equipped with an optional low detergent switch and when the detergent tank is empty or the pump is not pumping the green light on the Command Center will flash and "Low Detergent" will be displayed on the Command Center. Refer to page 26 for detailed information on the detergent pump.

## SIX MONTH MAINTENANCE

Every 6 months remove and inspect the ESP cells and check the following:

1. Check all the spray nozzles to ensure that they are spraying properly.
2. Examine the ESP Cells for the following:
  - a. Check for any missing or loose ionizer wires. Replace wires as necessary. (Refer to Ionizing Wire Replacement illustration).
  - b. Check for any physical damage to the collector plates. Plates can become bent at their corners and must be straightened to maintain proper plate spacing.
  - c. Check for any grease film build-up on the high voltage insulators (white porcelain material.) Clean the insulators to avoid possible high voltage "tracking" to the ground.
  - d. Check for any material which has lodged or built up between adjacent plates.

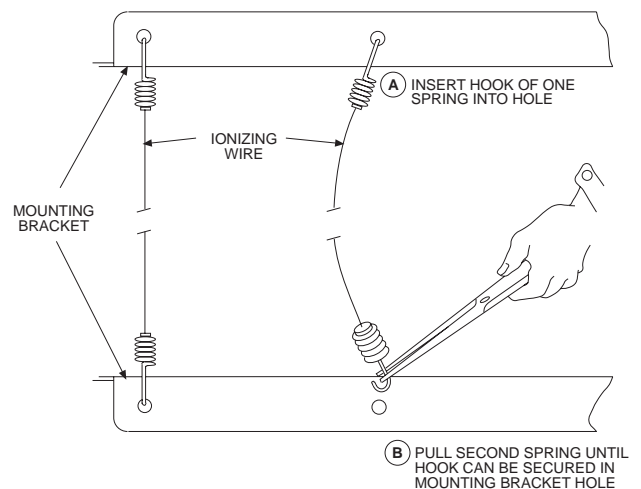
# ESP SECTION - PREVENTIVE MAINTENANCE



## Replacing the Ionizing Wire

1. Remove all of the broken wire from the cell mounting brackets.
2. Install the new wire:
  - A. Insert hook of one spring into hole.
  - B. Use long-nose pliers and carefully pull second spring until hook can be secured in mounting bracket hole.

**CAUTION:** The electrostatic cells are made of aluminum. DO NOT use any type of detergent that may attack aluminum or anodizing. It is highly recommended that Formula G-510 Colloid Cleaner be used in the wash system. Refer to Page 27 for details.



Note: See page 63 for part numbers

## IONIZING WIRE REPLACEMENT

# ESP SECTION - CELL CONFIGURATION



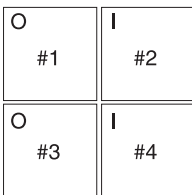
**1 CELL UNIT (1 X 1)**



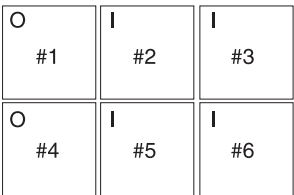
**2 CELL UNIT (2 X 1)**



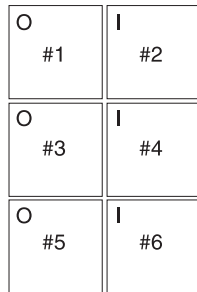
**3 CELL UNIT (3 X 1)**



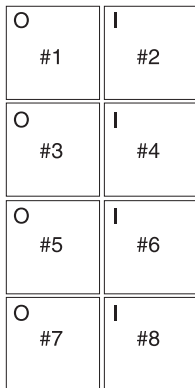
**4 CELL UNIT (2 X 2)**



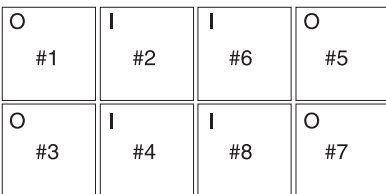
**6 CELL UNIT (3 X 2)**



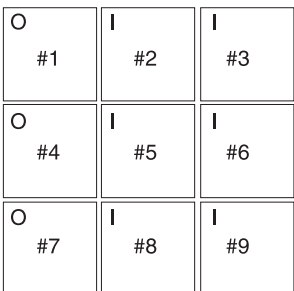
**(2 X 3)**



**(2 X 4)**



**8 CELL UNIT (4 X 2)**



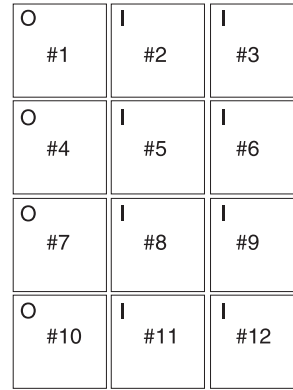
**9 CELL UNIT (3 X 3)**

**KEY**

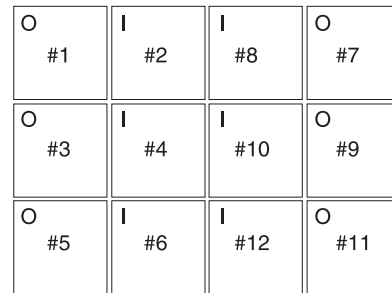
- O = OUTER CELL
- I = INNER CELL
- # = ASSIGNED CELL SPACE NUMBER

CONFIGURATION = W x H

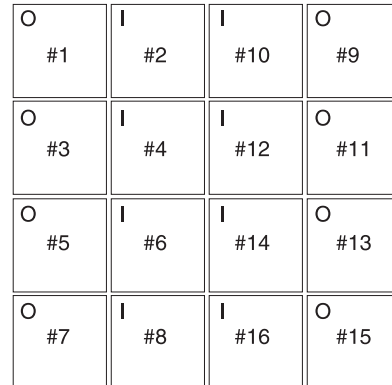
Note: Illustration of cells configured with airflow coming towards you.



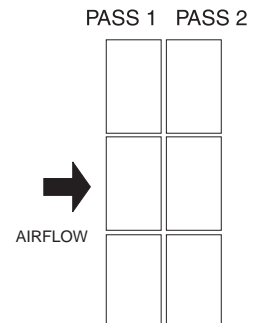
**12 CELL UNIT (3 X 4)**



**12 CELL UNIT (4 X 3)**



**16 CELL UNIT (4 X 4)**

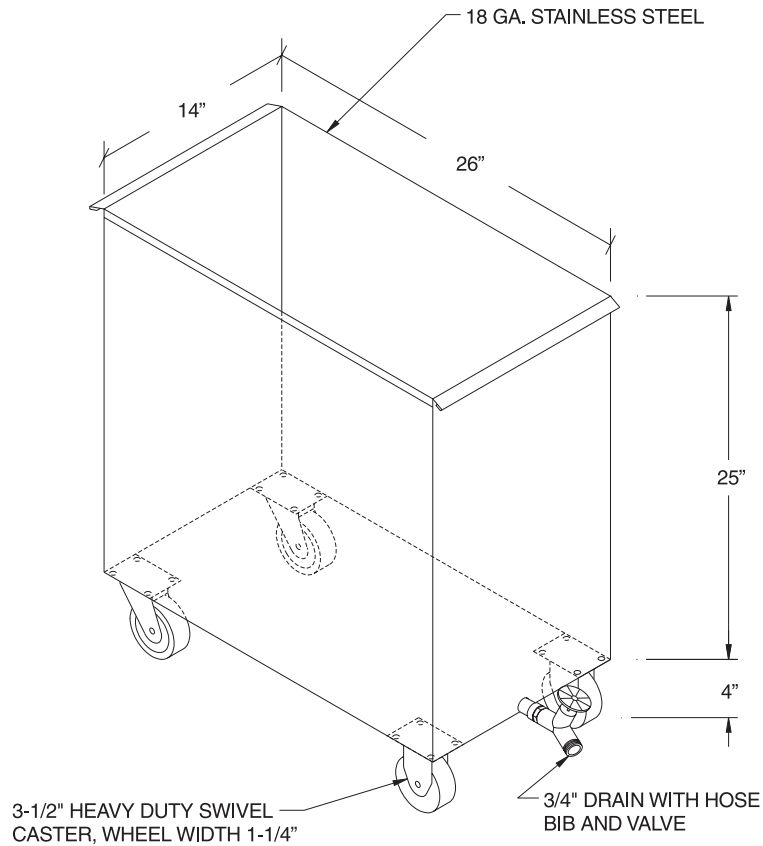


**CROSS SECTION OF A TYPICAL DOUBLE PASS UNIT "2 ESP"**

# ESP SECTION - SPARE CELLS

<b>SPARE CELL CHART</b> (Recommended quantities)		
SIZE OF UNIT	SPARE CELLS PROVIDED	
	OUTER CELL	INNER CELL
1 CELL UNIT	1	0
2 CELL UNIT	1	1
3 CELL UNIT	1	1
4 CELL UNIT	1	1
6 CELL UNIT	1	2
8 CELL UNIT	2	2
9 CELL UNIT	2	2
12 CELL UNIT	2	2
16 CELL UNIT	3	3

**NOTE:** Some units are equipped with a second row of ESP cells, referred to as double pass. Refer to the cross section illustration on page 28 for an example. Additional spare cells are not recommended for double pass units as the second pass does not get as dirty as the first pass.



**CELL SOAK TANK**

## Smoke Removal

Proper voltage through the ESP cells is essential for maximum smoke removal. There is one or more power supply transformers located in the electrical compartment of the C-ESP unit. The quantity is dictated by the number of cells, but typically there is one transformer(s) for every 2 or 3 cells. The transformer(s) outputs 5,000 volts DC to the repelling plates of the cell and 10,000 volts DC to the ionizing wires. The voltage of each transformer is monitored by a green "ESP ON" light located on the main Control Cabinet, and on the ESP Power Pack door of the unit electrical compartment. Operation of these lights is as follows:

**Solid Green Light** - This is a normal condition indicating that the ESP cells are operating properly.

**Fluctuating Green Light** - Normally a fluctuating green light is a temporary condition, lasting until the cells are dry, immediately following a wash cycle. This is caused by moisture left between the cell plates which will evaporate.

**Green Light Off** - A green light off indicates one of the following conditions exists:

Possible Problem	Possible Solution
No power to the transformer	<ol style="list-style-type: none"> <li>1. Check the 4 Amp fuse inside the C-5000-RSPC Command Center.</li> <li>2. Check the main circuit breaker.</li> <li>3. Check the toggle service switch inside the ClearAir electrical compartment to ensure it is in the on position.</li> <li>4. Push the "Start Fan" button on the command center.</li> </ol>
Safety switch in the disconnect position	Check the cell and electrical compartment access doors to ensure that they are closed and latched.
Voltage not getting to the cells	<ol style="list-style-type: none"> <li>1. Check to ensure that all outer cells are pushed in tight against the inner cells.</li> <li>2. Check to ensure that all lead wires are connected to the cells.</li> </ol>
Faulty cell. Possible causes are: <ol style="list-style-type: none"> <li>1. Grease buildup on plates or porcelain insulators.</li> <li>2. Foreign material lodged between plates.</li> <li>3. Broken ionizer wire.</li> </ol>	For all three possible causes first perform the ESP Cell Voltage Test as outlined on this page. If tests show the cell is faulty proceed as follows: <ol style="list-style-type: none"> <li>1. Remove grease buildup by cleaning or replace cell.</li> <li>2. Remove any foreign material between cell plates.</li> <li>3. Replace missing or broken ionizing wires following the instructions on page 27.</li> </ol>
Faulty Safety Switch	Check all safety switches to ensure that when pushed in, the micro switch closes. Electrically check the continuity of the micro switch.
Transformer Failure	Perform the Transformer Voltage Test procedure shown on page 31. Replace transformer if necessary.

## SAFETY SWITCH

There is one or more safety switches located behind the cell access door and the electrical compartment access door. The safety switch, when released by opening one of the doors, shuts off the power to the power supply transformer and bleeds power from the cells, by grounding the cell power wires. To check the safety switch for proper operation, open the doors and push the safety switch plunger and release. A definite "arc" should occur within the safety switch as the plunger is released.

## ESP CELL VOLTAGE TEST

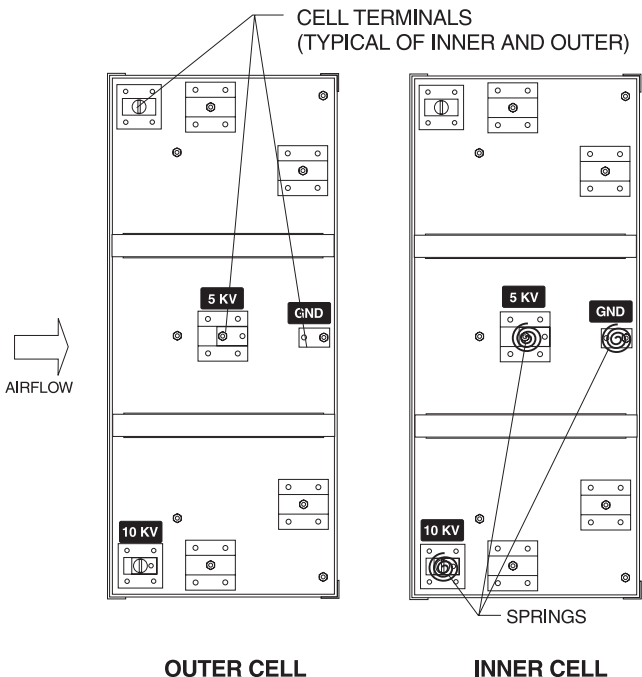
To check for proper operation of each cell, proceed as follows:

1. Open electrical compartment door.
2. Remove the 5KV and 10KV volt lead wires from the first cell.
3. By hand, push in door safety switch. Now measure voltage from ground to the 5KV volt lead wire and then from ground to the 10KV volt lead wire. If proper voltage is obtained, this is the cell that is causing the reduced voltage.

If the voltage is below normal, pull the leads on the next cell and repeat steps 1 through 3. Continue this procedure with each cell until the non-functioning cell is found. Inspect the non-functioning cell for any physical damage such as loose or broken ionizer wires, foreign material, or local grease accumulation which may be grounding between positive and negative collector plates.

If there is still a reduced voltage after all the leads have been removed from the cells, the problem is in the high voltage power supply. Recheck both the cell door safety switch and electrical compartment door safety switch for proper operation. Switch should "arc" and failure to arc could indicate a defective power supply transformer or 120 volt micro switch mounted within the safety switch.

If all these tests fail to find the problem area, check output voltage of the transformer as described on the next page.

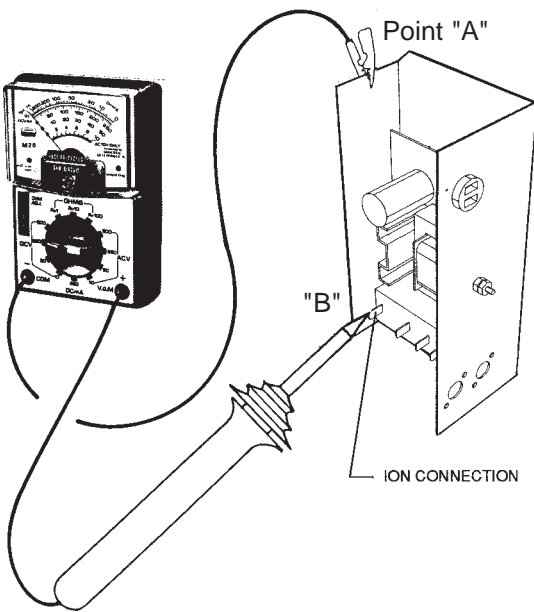


## TRANSFORMER VOLTAGE TEST

### IONIZER VOLTAGE TEST

To test the ionizer voltage, proceed as follows:

1. Disconnect the high voltage wires from the power supply (points "Coll" and "ION".)
2. Set selector switch on volt meter to the highest DCV scale.
3. Place probe or clip labeled "common" against "ground" (point "A".)
4. Place high voltage probe against the "ION" connection point. (Point "B")
5. Voltage should be 9,000 to 11,000 DC.
6. If voltage is below 9,000, it indicates that the power supply module is defective and must be replaced. For part number, refer to ESP Power Pack Parts on page 62.

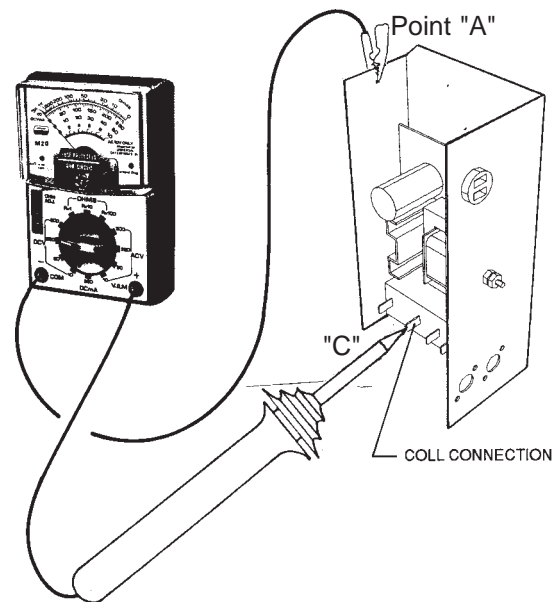


### COLLECTOR VOLTAGE TEST

To test the collector voltage, proceed as follows:

1. Disconnect the high voltage wires from the power supply (points "COLL" and "ION".)
2. Set selector switch on volt meter to the highest DCV scale.
3. Place probe or clip labeled "common" against "ground" connection on the power supply. (Point "A")
4. Place high voltage probe against the "COLL" connection point. (Point "C")
5. Voltage should be 4,700 to 5,500 DC.

If voltage is below 4,700, it indicates that the power supply module is defective and must be replaced. For part number, refer to ESP Power Pack Parts on page 62.

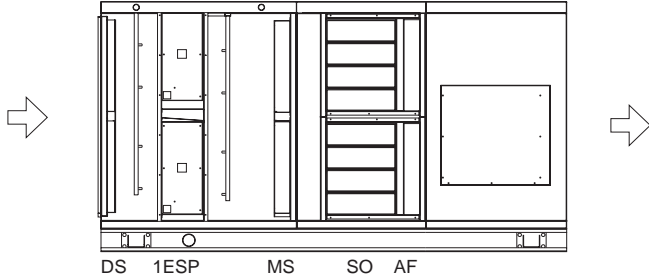




# ODOR CONTROL SECTION – MEDIA BED TYPE

## General Description

C-ESP units that include media bed odor control have an “SO” suffix for single pass and “DO” suffix for double pass odor control in the model number. Refer to the nameplate on the unit (see page 49 for sample). As shown in the illustration below, the odor control section consists of two major components: Odor control media and 30% after filters.



## Odor Control Media (bed type)

The odor control media furnished with your Captive-Aire unit is a product trade named KOR48/Carbon Blend manufactured by Cameron/Great Lakes, Inc. of Portland, Oregon. KOR48/Carbon Blend is made from a unique 50% aluminosilicate compound impregnated with 6% potassium permanganate and 50% activated carbon or 100% activated carbon.

The granules are approximately .10 inch in diameter and are poured into metal modules (see page 33) which slide into racks in the odor control section of the unit. As the air is drawn through the modules, the KOR48 the media oxidizes the lighter odor molecules and chemically changes them into harmless solids which remain in the media and the carbon absorbs the heavier odor molecules. This combination provides very effective odor control. The 100% carbon is a lower cost alternative that must have fire suppression system installed to protect it as it is flammable. This material absorbs odor and will gradually decrease in effectiveness until it starts to release the odors it has absorbed.

The life of the odor control media is dependent upon several factors such as the type of odor, amount of odor molecules, grease loading and air temperature. KOR48 media has a flat efficiency curve—meaning that the efficiency, or effectiveness, stays constant until the media has expended

and then the efficiency drops off rapidly. The carbon portion of the media’s efficiency drops continually during its life. Thus a regular schedule of change out needs to be established and followed.

## Filters

Smoke control filters in the odor control section of the system requires the replacement prior to them becoming loaded. It is recommended that the filters be inspected in accordance with the “Odor Control Media Inspection Frequency Chart” on this page, and replaced if necessary. The following chart provides data for ordering filters.

## Service and Maintenance

The KOR48/ carbon media is deep purple in color when new, turning to a dark brown during use and light tan when expended. Carbon media is black at the time of delivery. It is recommended that both medias be checked in accordance with the table below.

The C-ESP unit incorporates an “Odor Control Media Monitoring Tube” to facilitate inspection (refer to page 33 ). Using an open end wrench, turn the tube nut counter clockwise and remove the monitoring tube assembly. If the KOR48/ Carbon media is dark brown, break a granule open and if the inside is light tan there is very little life left and it should be replaced. If the outside of the granules are light tan the media is completely expended and must be replaced. If you are unable to determine the status send a small sample, one teaspoon, to Cameron Great Lakes noting the date of installation. They will conduct a life test and advise the results by fax or phone within 2 days of receipt. For further details contact Cameron Great Lakes .

## Cameron Great Lakes

2335 NW 29th  
Portland, OR 97210  
800-777-4044  
630-377-0711

The label next to the monitoring tube includes an area where the date of initial fill and the date of inspection can be filled in with a grease pencil.

**ODOR CONTROL MEDIA INSPECTION FREQUENCY CHART**

TYPE OF COOKING EQUIPMENT	FREQUENCY IN DAYS
<b>LIGHT DUTY</b> .....	<b>120</b>
Ovens, steamers, and kettles	
<b>MEDIUM DUTY</b> .....	<b>90</b>
Braising pans/Tilting skillets, fryers, griddles, grooved griddles, open burner ranges, hot top ranges, and conveyor ovens	
<b>HEAVY DUTY</b> .....	<b>60</b>
Gas and electric char broilers, upright broilers, woks and conveyor broilers	
<b>EXTRA HEAVY DUTY</b> .....	<b>30</b>
Solid fuel broilers	

**ODOR CONTROL MEDIA MONITORING TUBE**  
(USE GREASE PENCIL)  
**LAST REFILL**

---

DATE \_\_\_\_\_ INITIAL \_\_\_\_\_

**LAST INSPECTION**

---

DATE \_\_\_\_\_ INITIAL \_\_\_\_\_

FORM NO. OCM 797

# ODOR CONTROL SECTION – MEDIA BED TYPE

## Replacing the Media

There are two methods of replacing the media, the "Advancing Program" or Site Refill.

**Advancing Program** - This is a program offered by Cameron/Great Lakes, Inc. where they will ship recycled pre-filled modules in exchange for used modules. The pre-filled modules are shipped two to a box, 25" x 25" x 13" in size, weighing approximately 90 lbs. The boxes are shrink wrapped, 36 to a pallet. Three primary advantages of the "Advancing Program" are: 1) virtually no requirement for storage except for the short period of time needed to switch the new modules for the expended ones 2) minimizes unit down time and 3) avoids filling on site.

To participate in the "Advancing Program" proceed as follows:

1. Contact the local Cameron/Great Lakes distributor and order the number of modules required.
2. Upon receipt, remove the depleted modules and replace with the new modules.
3. Empty the media from the depleted modules into containers for disposal.
4. Pack the empty used modules into the boxes the new ones came in and ship back to the distributor.
5. Fill the media monitoring tube with new media and mark the date on the monitoring tube label.

**Site Refill** - Site refill involves the purchase and storage of new media, emptying and refilling the modules and disposing of the spent media. New media may be purchased from your local Cameron Great Lakes distributor. For the name and phone number of the local distributor call Cameron/Great Lakes.

New media comes in standard five gallon buckets which weigh 40 lbs each. One bucket will refill approximately 1.33 modules. It is recommended that new media is purchased no more than 2 weeks in advance of its use. The buckets should be protected against physical damage as KOR48/carbon will begin to oxidize any odor molecule when exposed to atmosphere. The buckets should be stored in a cool dry area.

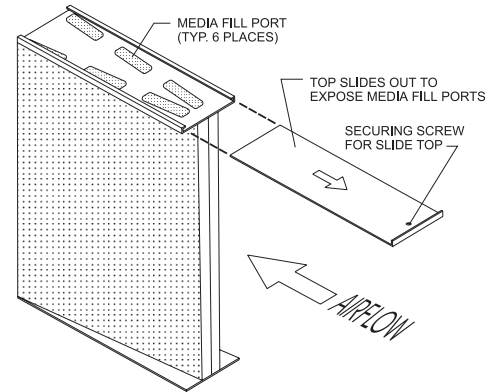
## Removing the Modules

Caution - each module weighs approximately 30 lbs. and may be awkward to handle particularly in the upper racks. It is highly recommended that a heavy duty steel wheeled ladder be used when removing the upper modules.

Caution - Exhaust fan must be off before opening the odor control media access door.

Refilling the modules is a relatively simple task not requiring any special tools. Follow steps 1-11:

- Step 1. Set the module on end so the securing screw is on top.
- Step 2. Remove the securing screw and slide the cover plate off.



Step 3. Place the filling jig over opening.

Step 4. Pour the media into the module.

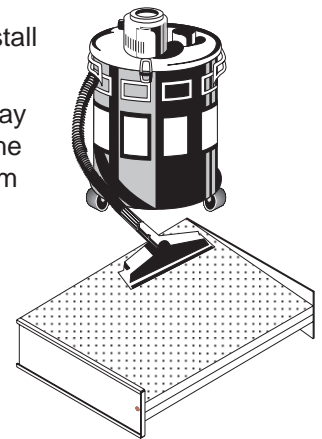
Step 5. To eliminate voids, shake or vibrate the module to ensure that the media settles.

Step 6. Continue adding media until module is full.

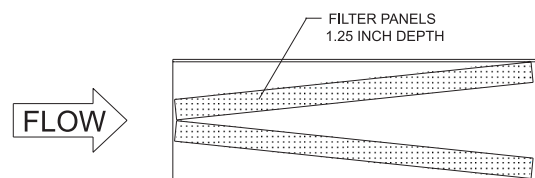
Caution: Do not overfill as it may cause the sides to bulge.

Step 7. Replace cover plate and install securing screw.

Step 8. Optional - some dusting may occur on initial start up of the unit. To minimize this, vacuum or blow out the modules.

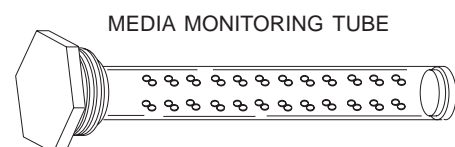


Step 9. Slide the modules back into the rack being cautious that the airflow label is matching the airflow of the unit.



Step 10. Close the odor control media access door.

Step 11. Pour new media into the media monitoring tube and re-install. Record the date on the label.



The Spray Odor Unit operates on spray-on and spray-off timed cycles while the unit is in the “Fan On” mode.

The Spray Odor Control includes two (2) timers, one (1) for the “Cycle Timer” (this is the spray “OFF” timer) and one (1) for the “Spray Timer” (this is the spray “ON” timer). Both timers are calibrated and can be set between 5 and 600 seconds. The factory/setting is always 15 seconds “ON” and 15 seconds “OFF”.

## **CYCLE TIMER**

To set the “Off” period, turn the dial to the desired off time interval.

## **SPRAY TIMER**

To set the “On” period, turn the dial to the desired on time interval.

## **AIR PRESSURE**

Factory set to 20 PSIG.

## **Electrical Controls**

To adjust the spray odor cycle and timers, open the Spray Odor Cabinet, and remove the screwed-in-place timer control cover plate. Adjust as necessary for satisfactory odor control.

**CAUTION: Always de-energize the C-TPF before opening the Electrical and Timer Control Panel inside the Odor Spray Cabinet.**

## **SPRAY ODOR CONTROL SPRAY NOZZLE ASSEMBLY**

### **NOZZLE MAINTENANCE**

To obtain the best performance from your nozzle, it will be necessary to clean it periodically.

The nozzle may become clogged and cease spraying due to factors such as dust, foreign particles accumulated in the orifice, and/or leakage in the air or liquid section of the nozzle.

The following procedure should be followed to maintain the nozzle’s performance:

1. Check the air line, which is connected from the compressor unit to the compression fitting and threaded into the air inlet side of the nozzle, for any leakage.
2. Check the liquid suction line, which is connected to the liquid inlet side of the nozzle, and ensure that it is immersed in the odor control solution.
3. If it appears that the nozzle is only blowing air and does not lift up the odor control solution out of the container, do the following:

Remove the cleanout plug from the nozzle body and, using a very thin pin or wire, clean the hole in the fluid cap (orifice) and replace the cleanout plug. Remove the foot valve from the liquid container and inspect screen for clogging. Brush clean if clogged.

## **SPRAY ODOR CHEMICAL**

In order for the spray odor system to work correctly the system must be supplied with a chemical solution. This solution in conjunction with the delivery nozzle system that finely atomizes the spray is what makes the system work. We recommend the use of **FORMULA GS-710**. This material has been effective at removing between 80% and 90% of the odors from the kitchen exhaust in many applications. For the contact information of the nearest distributor of **FORMULA GS-710**:

### **20/10 Products Inc.**

P.O. Box 7609

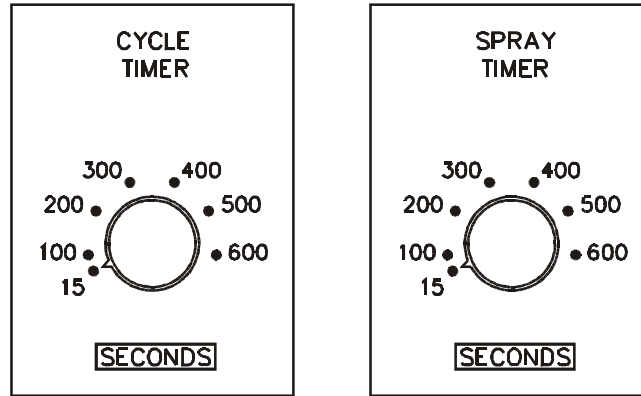
Salem, OR 97303

Phone: 800-286-2010

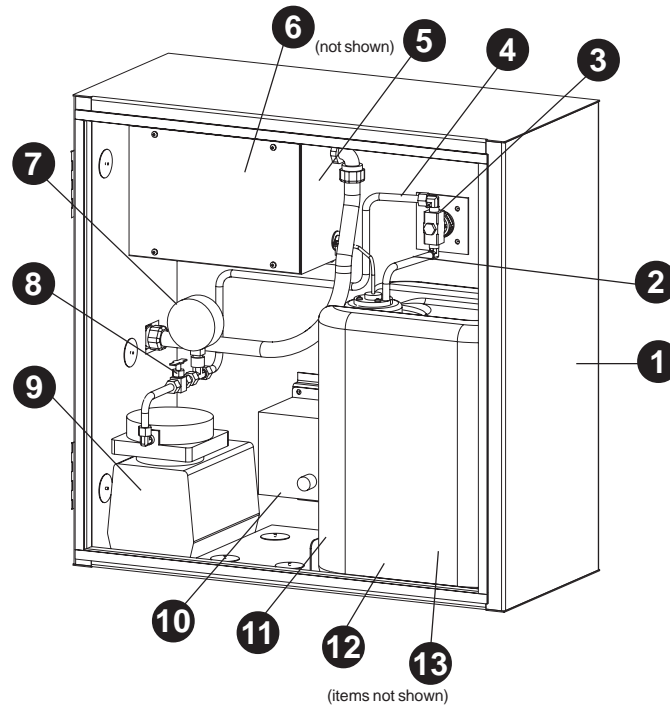
FAX: 503-363-4296

E-Mail: [twentyten@juno.com](mailto:twentyten@juno.com)

# ODOR CONTROL SECTION – CHEMICAL SPRAY TYPE



**CYCLE AND SPRAY TIMER RELAY - ITEM #6**



Spray Odor Component Schedule		
Item No.	Description	Part No.
1	Spray Odor Cabinet Assembly (25" x 25")	19119
2	1/4" I.D. Flexible Suction Tube	10272
3	Spray Nozzle Assembly	19065
4	3/8" Copper Tubing	11000
5	Electrical Box	N/A
6	Cycle and Spray Timer Relay	19073
7	Pressure Gauge	10276
8	Needle Valve	19070
9	Air Compressor	19072
10	Heater	19075
11	5 Gallon (18.9 Liter) Container of GS-710	19097
12	Level Sensor for Spray Odor Chemical (In Tank)	19071
13	1/4" Foot Valve (In Tank)	10269

# EXHAUST FAN SECTION

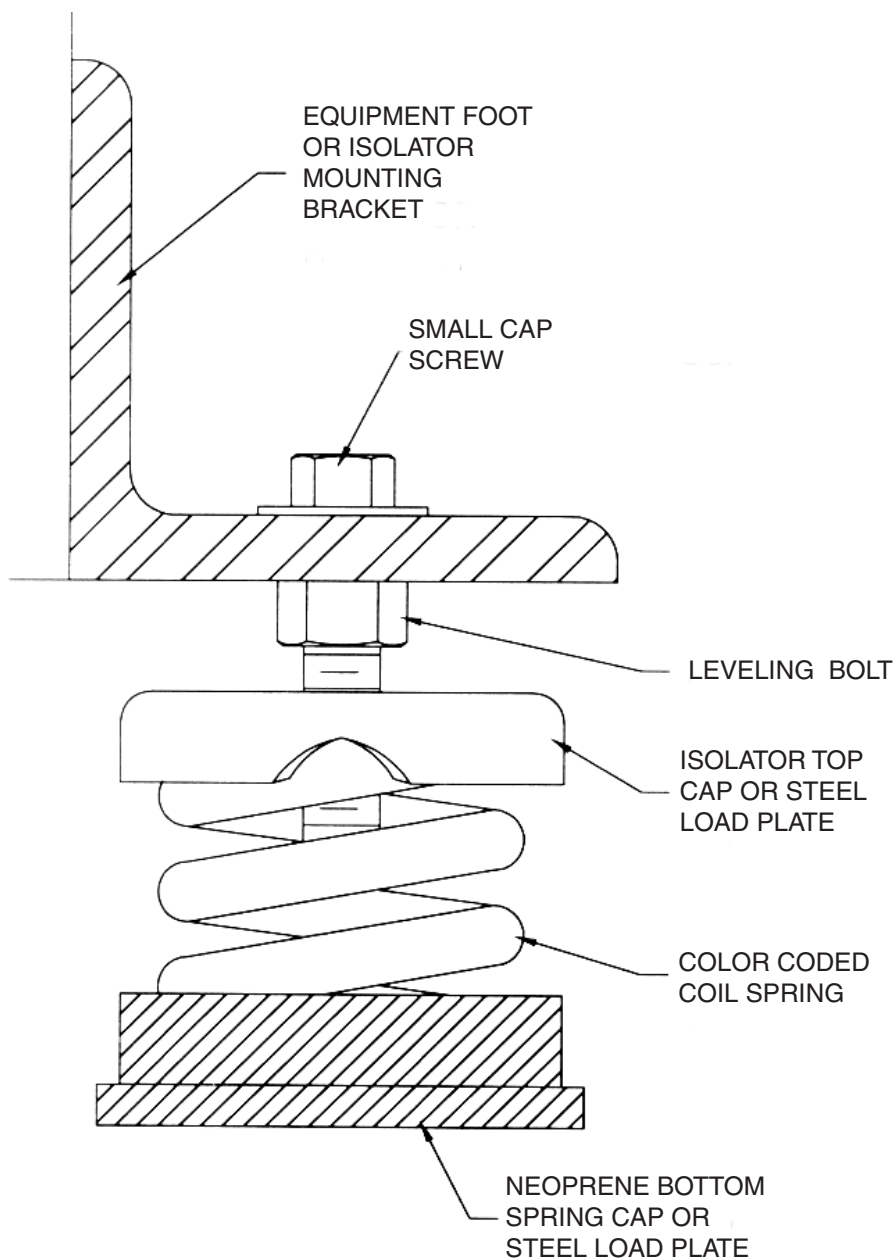
## GENERAL

The exhaust fan in the C-ESP Unit is a heavy duty type. The size of the fan, motor, and drives have been chosen for the most efficient operation.

## INITIAL SET-UP

For shipping purposes the spring isolators under the fan have been bolted down to prevent movement. To un-bolt and set up the springs properly proceed as follows:

1. Locate the red shipping hold down brackets. These are attached to the fan base and the unit floor.
2. Remove the Tech screws.
3. Check the fan for free movement, making sure that none of the springs are grounded out against a bolt or the unit floor.



## IPRE-OPERATIONAL MAINTENANCE

Before starting the exhaust fan perform the following pre-operational maintenance:

### 1. Set screws & Belts:

- a. Rotate fan impeller to check for shifting that may have occurred during shipment. If necessary, shift wheel position and re-tighten.
- b. Check belt and pulley alignment.
- c. Check tightness of setscrews in blower wheel hub.
- d. Check tightness of set screws in bearing locking collar.
- e. Check tightness of set screws in motor and fan pulleys.
- f. Check tightness of all frame bolts and base bolts.
- g. Check tightness of bearing mounting bolts.

**2. Belt tension.** Take up or relieve tension in belts so that there is approximately ¾" to 1" deflection under 3 pounds pressure based on 2½ to 3 foot centers on drive. Adjustment of belt tension is accomplished by use of adjustable motor base.

## INITIAL FAN LUBRICATION

To prevent corrosion bearings should receive grease and be rotated. Rotate the wheel several revolutions every three to five days to keep a coating of grease on all internal bearing parts. Turn the wheel by hand while greasing bearings. A clean 1/16" bead of grease must appear on each side of each bearing. Refer to specific bearing lubricating instructions on the fan.

Bearings which are to be stored or idle for an extended period of time should be wrapped in a neutral grease-proof paper, foil, or plastic film.

After long-term storage, grease should be purged from the bearings and fresh grease injected prior to start-up.

## INITIAL OPERATION

After pre-operational checks, unit is ready for operation:

1. Start up blower. Check rotation.
2. If blower impeller is turning in the wrong direction, reverse rotation per instructions furnished by motor manufacturer.

## FAN PREVENTIVE MAINTENANCE

Every six months conduct the following maintenance:

1. Check for condition and tension of belts. Replace cracked, glazed or frayed belts. Re-check tension after 48 hours and re-tension if necessary. Do not over-tighten belts or bearing damage may result. Belt should depress its width when pressed firmly inward at midway point between the pulleys and belt should be tight enough to prevent slippage. When replacing worn belt, replace motor pulley if "shoulder" has a worn-in groove.
2. Check fan and motor bearings for possible binding, noise or overheating. Lubricate fan in accordance with instructions on fan housing.

4. Motors generally used are of the sleeve bearing type and require periodic oiling. A good grade of ASE No. 10 lubricating oil should be inserted into the oiler connections on each end of the motor about every two months. Not more than a teaspoonful should be used; over-oiling will result in oil drip.

## TROUBLESHOOTING

### 1. Reduced Airflow:

- a. Blower impellers operating in wrong direction.
- b. Belt slippage or belt is broken.
- c. Overload, starter cutout.

### 2. Noise in Blower:

- a. Bad bearings.
- b. Loose tie rods or blades.
- c. Blower wheels loose on shaft, wheels rubbing on housing.
- d. Drive pulley loose on shaft.
- e. Foreign object located in blower wheel or blower housing.

Necessary Action - Correct situation found immediately, as continued operation can shorten life of component parts and result in poor airflow and eventual general shut-down of system until needed repair is made.

### WARNING:

Running Fan Backwards will overheat the motor and can cause bearing failure or other serious damage and will Void Warranty.

## RP DEVICE

The reduced pressure principle device (RP) is required to prevent contaminated water from backflowing upstream to potable water. The unit provided in the Captive-Aire control cabinet is manufactured by Watts Regulator Co.

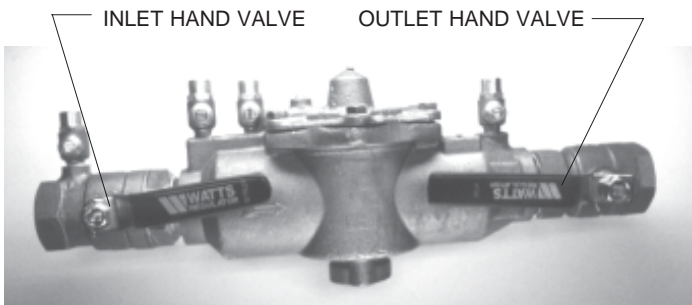
**1. Initial Start-up** - To avoid water hammer or shock damage perform the following initial start-up procedures:

- A. Close the outlet hand valve.
- B. Open the inlet hand valve slowly, fill the valve and bleed the air through test cock number 2, 3, and 4.
- C. When the valve is filled, open the outlet hand valve slowly and fill the remaining supply system. The initial start-up procedure is now complete.

The reduced pressure principle device type backflow preventer (Refer to illustrations on this page) consists of two primary chambers with spring loaded check valves and a secondary chamber with a spring loaded relief valve. This device prevents backflow by opening and closing the check valves if the pressure from the inlet side to the outlet side of the device varies.

**1. Intermittent Discharge** - Intermittent discharge of water through the relief valve is fairly common and usually occurs if there is inlet pressure fluctuations of more than 3 psi and when the solenoid valve closes after a wash cycle.

**2. Continuous Discharge** - If there is continuous discharge of water out the relief valve when the ventilator is not in a wash cycle, do the following:



**REDUCED PRESSURE PRINCIPLE DEVICE  
BACKFLOW PREVENTER**

A. Leave the inlet hand valve open and close the outlet hand valve. If there is still continuous discharge it indicates that foreign material is preventing the first check valve from closing. If flushing will not clear the unit, remove and clean the first check valve.

B. If there is continuous discharge of water out of the relief valve during a wash cycle, there is foreign material preventing complete closing of the relief valve. Flushing the relief valve may correct this condition.

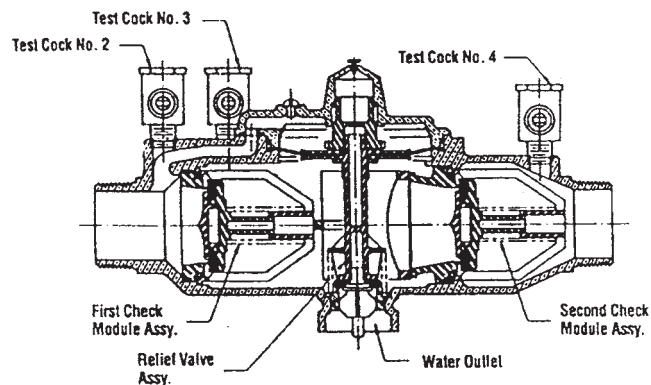
Repeat procedure if necessary. If flushing does not stop discharge with flow through the device, remove and clean relief valve.

In no case should the relief valve outlet port be plugged, closed off or restricted.

This device should be inspected occasionally for continual discharge from the relief valve, which indicates a need for maintenance. It is recommended that the RP device be inspected and tested once a year.

**NOTE:** Some regulations require annual inspection and testing by a company certified to perform such duties.

See Instruction Manual IS-TK-DP, obtainable from your Watts installer or distributor. For the name of your nearest installer or distributor, call Watts Regulator at (978) 688-1811.



**REDUCED PRESSURE PRINCIPLE DEVICE  
BACKFLOW PREVENTER**

## TROUBLE-SHOOTING

SYMPTOM	POSSIBLE PROBLEM	CORRECTIVE ACTION
<b>EXHAUST FAN</b>		
<p>1. When the "Start Fan" button is pushed, the green light does not come on, and the damper does not move to the exhaust position.</p> <p>2. If when the "Start Fan" button is pushed, the green light comes on but the exhaust fan does not come on.</p>	<p>A. No power in the control cabinet.</p> <p>B. The control is in an Internal Fire Mode.</p> <p>A. Overload protector on magnetic starter tripped.</p> <p>B. If an HOA (Hands On/Automatic) type magnetic starter switch is used, the selector switch may have been moved from the automatic position.</p> <p>C. Exhaust fan circuit breaker tripped.</p> <p>D. If the system is equipped with a disconnect switch for the exhaust fan, a fuse or fuses may have blown out.</p>	<p>1. Check the circuit breaker serving the control cabinet. The "Run" light on the "PLC" should be on at all times. If it is not on it indicates no power is getting to the control. Check all the fuses inside the control cabinet on output module, terminal blocks, and transformer.</p> <p>1. Check for continuity between #15 and <b>GXT</b>. If there is no continuity between #15 and <b>GXT</b>, refer to FIRE CYCLE in the TROUBLE -SHOOTING section.</p> <p>1. Push the "Reset" button on the magnetic starter and the push the "Start Fan" button on the command center.</p> <p>1. Check switch and turn selector to the automatic position.</p> <p>1. Reset circuit breaker.</p> <p>1. Check continuity of fuses and replace if necessary.</p>
<b>WASH SYSTEM</b>		
<p>1. When the "Start Wash" button is pushed, the green light does not come on, and the damper does not move to the wash position.</p> <p>2. The C-ESP Unit is not washing properly.</p>	<p>A. The control is in an Internal Fire Mode.</p> <p>A. Water supply turned off or partially on.</p> <p>B. Low water pressure.</p> <p>C. Low water temperature.</p>	<p>1. Check for continuity between #15 and <b>GXT</b>. If there is no continuity between #15 and <b>GXT</b>, refer to FIRE CYCLE in the TROUBLE -SHOOTING section.</p> <p>1. Check the hand valve inside the control cabinet.</p> <p>2. Check any valves upstream of the control cabinet.</p> <p>1. Check the water pressure gauge inside the control cabinet. Pressure should be 60 PSI min. while the equipment is washing.</p> <p>1. Check the temperature gauge inside the control cabinet. The temperature should be between 160°F - 180°F. If below temperature it must be increased.</p>



## TROUBLE-SHOOTING

SYMPTOM	POSSIBLE PROBLEM	CORRECTIVE ACTION	
<b>WASH SYSTEM CONT.</b>			
<p>2. The C-ESP Unit is not washing properly.</p>	D. Inadequate wash time	1. Increase length of wash time. The length of the wash cycle may be set between 3 and 9 minutes. Recommended times are: 3 minutes for light-duty equipment, 5 minutes for medium duty and 9 minutes for heavy-duty equipment. (Refer to wash timing instructions on Page 22 to adjust the length of wash cycle.)	
	E. Clogged spray nozzles.	1. While the wash cycle is on, open the inspection door slightly and visually check spray of nozzles. If a nozzle is clogged, remove, and clean by running a small wire through it.	
	F. Detergent pump lost its prime or not pumping properly.	1. Refer to Page 26 for trouble shooting detergent pump.	
	G. Detergent tank empty.	1. Check and fill detergent weekly.	
	H. Improper detergent.	1. Refer to Page 27 for recommended detergent.	
	I. Inadequate wash frequency.	1. Normally only one wash is required in a cooking day. However, if the cooking operation is extremely heavy, such as char broiler and wok cooking it may be necessary to wash twice in a cooking day.	
	<p>3. Water does not come on when "Start Wash" is pushed, but exhaust fan turns off and damper closes, to the wash position</p>	A. Water supply turned off	1. Check hand valve inside control cabinet. 2. Check any hand valve upstream of control cabinet.
		B. Malfunctioning solenoid valve. If the pump is operating there is a problem with the valve or valve wiring.	1. Coil may be burned out. Check continuity. 2. Foreign material in the hot water supply line may have clogged the solenoid valve and prevented its opening. If this is the case, a light tap on the solenoid valve housing will release the valve. 3. Check wiring diagram for proper wire # and check for 120 volts during wash.
		C. Malfunctioning PLC.	1. Check the appropriate output light on the PLC (Refer to PLC status light chart on Page 54). If the output light is not on, the PLC needs to be reprogrammed or possibly replaced.
		D. Loose connection to solenoid valve.	1. Tighten connection.
<p>4. Water sprays on when the C-ESP unit is not in a wash cycle ("Wash On" light not on).</p>	A. If the "Fire" light on the command center is on continuous	1. The internal fire mode has been activated via thermostats. Refer to "Fire Cycle" in this trouble-shooting section.	
	B. If the "Fire" light on the command center is flashing.	1. The remote fire switch has been pulled. Refer to "Fire Cycle" in this trouble-shooting section.	
	C. Debris stuck in solenoid valve.	1. Turn off the water and disassemble solenoid valve. Remove debris and reassemble.	

## TROUBLE-SHOOTING

SYMPTOM	POSSIBLE PROBLEM	CORRECTIVE ACTION
<b>FIRE CYCLE</b>		
<p>1. If the C-ESP Unit is in a internal fire cycle, "Fire" light on continuous, water sprays on but there is not a fire.</p> <p>2. If the ventilator is in a external fire mode ("Fire" light flashing, water sprays on and exhaust fan on) but there is no fire.</p>	<p>A. Faulty thermostat, relay Cr4 or break in thermostat circuit.</p> <p>B. The remote Fire Switch (If provided) has been pulled.</p> <p>C. The external fire mode may have been initiated from another source, such as a building alarm system, DDC system, pre-engineered fire system etc.</p>	<p>1. Check continuity of thermostats and circuit. Refer to wiring diagram on Page 52. Note: Thermostats are wired in parallel. Replace thermostat(s) or relay if required. Check for jumper between GXT and 15. If GX2 hoods are connected, check for continuity between GXT and 15. If not, trace out circuit and find break.</p> <p>1. Open the Fire Switch and flip the toggle switch to the "Normal position".</p> <p>1. Disconnect wires from terminals 4 and FS to isolate external sources. If external fire mode stops investigate external sources and remove cause.</p>
<b>BACK FLOW PREVENTERS</b>		
<p>Model CPGC-6000-ESP Series control cabinet uses a vacuum breaker/check valve assembly for backflow prevention. Model CPGC-6000-ESP Series control cabinet uses a reduced pressure principle device (RP) for backflow prevention. The type of backflow preventor used is dictated by state, county or city code.</p> <p>1. <b>VACUUM BREAKERS</b> Vacuum breaker leaks or spits either at the beginning or end of the wash cycle.</p>	<p>A. Improper Installation.</p> <p>B. Sticking check valve.</p> <p>C. Deteriorated check valve washers.</p>	<p>1. Vacuum breaker must be mounted 6" higher than line going to the ventilator.</p> <p>1. Remove the top cap of the vacuum breaker and check to make sure the nylon check valve slides up and down on the guide stem properly, and that the stem is straight. Clean stem or straighten as necessary.</p> <p>1. Check to make sure that the rubber washer on top of the nylon check seats properly against the machined surface, and that the surfaces of both the rubber washer and the machined surface are smooth. Replace check if necessary.</p>

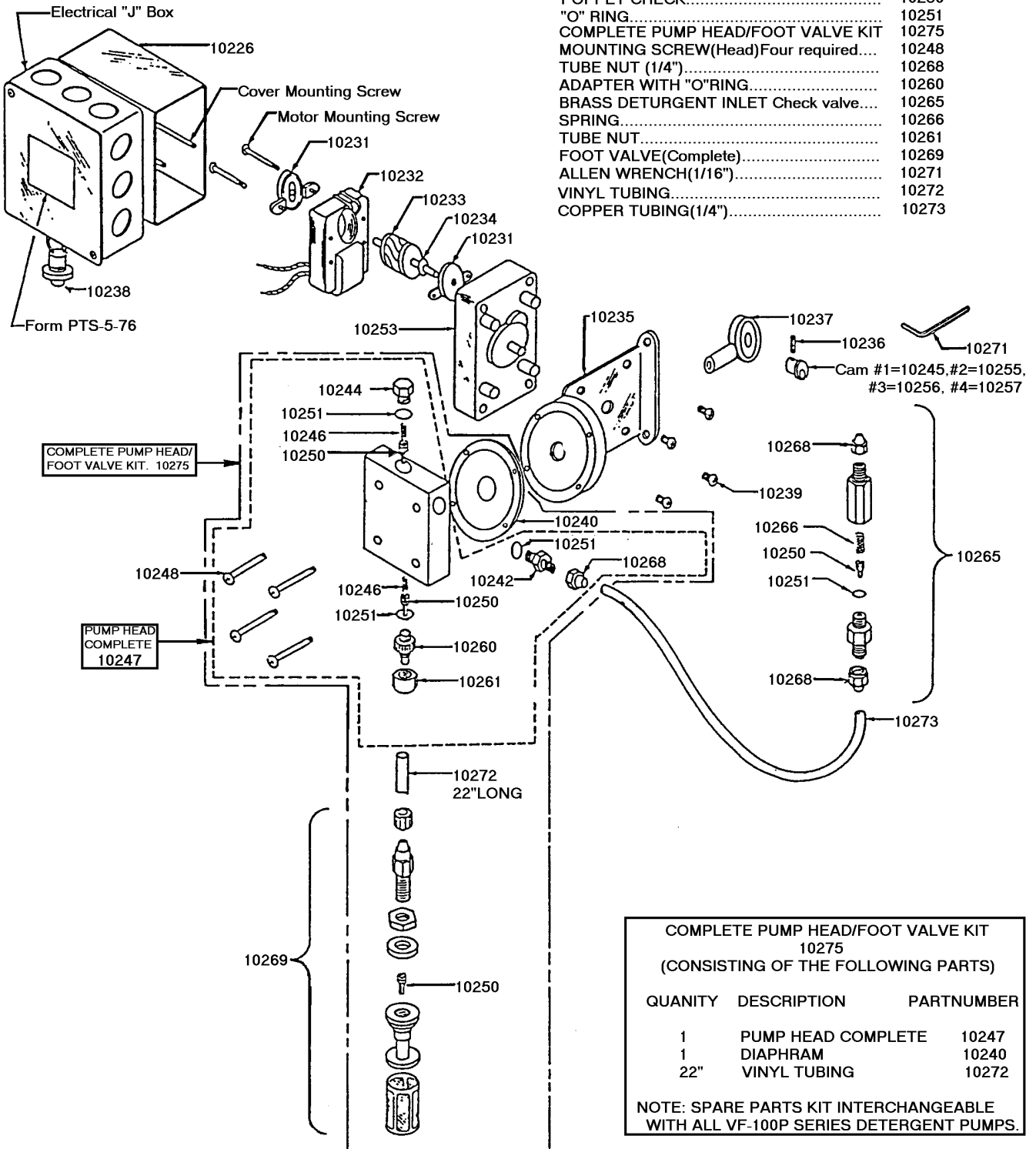
## TROUBLE-SHOOTING

SYMPTOM	POSSIBLE PROBLEM	CORRECTIVE ACTION
<b>BACK FLOW PREVENTORS CONT.</b>		
<p><b>RP DEVICE</b></p> <p>2. Intermittent discharge of water.</p> <p>3. Continuous discharge of water when ventilator is not in a wash cycle.</p> <p>4. Continuous discharge of water out relief valve when ventilator is washing.</p>	<p>A. Intermittent discharge of water through the relief valve is fairly common and usually occurs if there is inlet pressure fluctuations of more than 3 psi and when the solenoid valve closes after a wash cycle.</p> <p>A. Foreign material in the check valve.</p> <p>A. Foreign material in relief valve.</p>	<p>1. No action necessary.</p> <p>1. Leave the inlet hand valve open and close the outlet hand valve. If there is still continuous discharge it indicates that foreign material is preventing the first check valve from closing. If flushing will not clear the unit, remove and clean the first check valve. (Refer to illustration on Page 40).</p> <p>1. Foreign material preventing complete closing of the relief valve. Flushing the relief valve may correct this condition. Repeat procedure if necessary. If flushing does not stop discharge with flow through device, remove and clean relief valve. In no case should the relief valve outlet port be plugged, closed off or restricted.</p>
<b>DRAINS</b>		
<p>1. If during a wash cycle water overflows the gutter and comes out inlet slot.</p>	<p>A. Clogged drain outlet (Note: Each ventilator section has its own drain outlet).</p> <p>B. Drain system clogged (If more than one ventilator system is not draining it indicates that the drain system is clogged).</p> <p>C. Pre-flush line not in drain opening.</p> <p>D. Clogged or full grease trap.</p>	<p>1. Reach in through the inlet slot of the ventilator and check to see if foreign material such as rags, paper towels, order chits, etc., have clogged the drain opening.</p> <p>1. A chemical drain cleaner applied as per instructions may dissolve stoppage. Pour cleaner into main grease gutter at drain opening.</p> <p>2. Hire a drain roter service to clear entire system.</p> <p>1. This line is located in the ventilator and runs from the spray manifold to the ventilator drain. Check to make sure that the pre-flush line is aimed into the drain opening so that it purges the drain properly.</p> <p>1. Some cities and counties have codes which require grease traps. If a grease trap is in use, check to ensure that it is not clogged.</p>
<b>MISCELLANEOUS</b>		
<p>1. "Enter Code" displayed on Command Center.</p> <p>2. Wrong language displayed on Command Center</p>	<p>1. Enable Code has not been entered at factory.</p> <p>2. "English" / Espanol" button has been pressed.</p>	<p>1. Contact Factory.</p> <p>2. Press the "English / Espanol" button to toggle the language displayed between English and Spanish (Espanol).</p>

# PARTS - DETERGENT PUMP

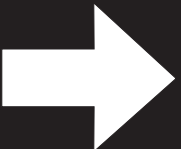
DETERGENT PUMP  
MODEL NUMBER VF-100P-60B

ITEM.	PART NUMBER	ITEM.	PART NUMBER
MOTOR COVER.....	10226	YOKE AND BEARING ASSEMBLY.....	10237
ELECTRICAL "J" BOX.....	N/A	PUSH BUTTON TEST SWITCH.....	10238
COVER MOUNTING SCREWS.....	N/A	CAM #1.....	10254
MOTOR MOUNTING SCREWS.....	N/A	CAM #2.....	10255
ARMATURE BEARING.....	10231	CAM #3.....	10256
COIL (115 VOLT).....	10232	CAM #4.....	10257
COIL (220 VOLT).....	10259	SCREWS FOUR REQUIRED.....	10239
ARMATURE.....	10233	DIAPHRAGM.....	10240
ARMATURE SPACER.....	10234	BRASS OUTLET.....	10242
GEAR BOX ASSEMBLY.....	10253	*TOP CAP.....	10244
BRACKET.....	10236	SPRING.....	10246
SET SCREW.....	10237	PUMP HEAD (Complete with all fittings).....	10247
		POPPET CHECK.....	10250
		"O" RING.....	10251
		COMPLETE PUMP HEAD/FOOT VALVE KIT.....	10275
		MOUNTING SCREW(Head)Four required....	10248
		TUBE NUT (1/4").....	10268
		ADAPTER WITH "O"RING.....	10260
		BRASS DETURGENT INLET Check valve....	10265
		SPRING.....	10266
		TUBE NUT.....	10261
		FOOT VALVE(Complete).....	10269
		ALLEN WRENCH(1/16").....	10271
		VINYL TUBING.....	10272
		COPPER TUBING(1/4").....	10273

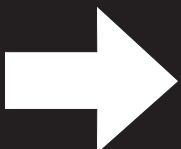






<p align="center"><b>SMOKE POLLUTION CONTROL CELL</b>  <b>WARNING: CELL AND UNIT AIRFLOW DIRECTION MUST MATCH</b></p> <p><b>CAUTION</b> <b>High Voltage</b> - Be sure power is off and high voltage circuit is grounded before touching the wire terminals. Refer to the Technical Manual for complete operation &amp; maintenance instructions.</p> <p><b>Cell Removal</b> - This cell weighs more than 52 lbs. (24kg.) Handle with care when removing for cleaning and servicing. When handling cell, hold framework only. Do not touch the plates or ionizing wires as they could be damaged.</p> <p><b>Cleaning Cell</b> - The smoke pollution control cells in this system are made of aluminum. Use of a detergent harmful to aluminum will void the warranty and may cause permanent damage.</p>	<p><b>INNER CELL</b>  <b>MODEL NO.: C-24-I</b></p> <p><b>AIRFLOW</b></p>  <p><b>AIRFLOW</b></p> <p><b>INNER CELL</b>  <b>MODEL NO.: C-24-I</b></p>
<p><b>SMOKE POLLUTION CONTROL CELL</b>  <b>WARNING: CELL AND UNIT AIRFLOW DIRECTION MUST MATCH</b></p> <p><b>CAUTION</b> <b>High Voltage</b> - Be sure power is off and high voltage circuit is grounded before touching the wire terminals. Refer to the Technical Manual for complete operation &amp; maintenance instructions.</p> <p><b>Cell Removal</b> - This cell weighs more than 52 lbs. (24kg.) Handle with care when removing for cleaning and servicing. When handling cell, hold framework only. Do not touch the plates or ionizing wires as they could be damaged.</p> <p><b>Cleaning Cell</b> - The smoke pollution control cells in this system are made of aluminum. Use of a detergent harmful to aluminum will void the warranty and may cause permanent damage.</p>	

**INNER ESP CELL NAMEPLATE (BLUE AND SILVER)**

<p align="center"><b>SMOKE POLLUTION CONTROL CELL</b>  <b>WARNING: CELL AND UNIT AIRFLOW DIRECTION MUST MATCH</b></p> <p><b>CAUTION</b> <b>High Voltage</b> - Be sure power is off and high voltage circuit is grounded before touching the wire terminals. Refer to the Technical Manual for complete operation &amp; maintenance instructions.</p> <p><b>Cell Removal</b> - This cell weighs more than 52 lbs. (24kg.) Handle with care when removing for cleaning and servicing. When handling cell, hold framework only. Do not touch the plates or ionizing wires as they could be damaged.</p> <p><b>Cleaning Cell</b> - The smoke pollution control cells in this system are made of aluminum. Use of a detergent harmful to aluminum will void the warranty and may cause permanent damage.</p>	<p><b>OUTER CELL</b>  <b>MODEL NO.: C-24-O</b></p> <p><b>AIRFLOW</b></p>  <p><b>AIRFLOW</b></p> <p><b>OUTER CELL</b>  <b>MODEL NO.: C-24-O</b></p>
<p><b>SMOKE POLLUTION CONTROL CELL</b>  <b>WARNING: CELL AND UNIT AIRFLOW DIRECTION MUST MATCH</b></p> <p><b>CAUTION</b> <b>High Voltage</b> - Be sure power is off and high voltage circuit is grounded before touching the wire terminals. Refer to the Technical Manual for complete operation &amp; maintenance instructions.</p> <p><b>Cell Removal</b> - This cell weighs more than 52 lbs. (24kg.) Handle with care when removing for cleaning and servicing. When handling cell, hold framework only. Do not touch the plates or ionizing wires as they could be damaged.</p> <p><b>Cleaning Cell</b> - The smoke pollution control cells in this system are made of aluminum. Use of a detergent harmful to aluminum will void the warranty and may cause permanent damage.</p>	

**OUTER ESP CELL NAMEPLATE (RED AND SILVER)**

# NAMEPLATE DATA

The C-ESP nameplate is located on the electrical compartment access door of the unit. If inquiring on service or ordering parts, please have model number and serial number available.

<p style="text-align: center;"><b>SMOKE POLLUTION CONTROL UNIT MODEL NUMBER</b></p> <div style="border: 1px solid black; height: 20px; width: 100%;"></div> <div style="border: 1px solid black; height: 20px; width: 100%;"></div> <p style="text-align: center; margin-top: 20px;"><b>SERIAL NUMBER</b></p> <div style="border: 1px solid black; height: 20px; width: 100%;"></div> <p style="text-align: center; margin-top: 20px;"><b>SUITABLE FOR USE WITH CONTROL MODEL NO.</b></p> <div style="border: 1px solid black; height: 20px; width: 100%;"></div> <p style="text-align: center; margin-top: 20px;"><b>FOR EITHER INDOOR OR OUTDOOR INSTALLATION</b></p> <p style="text-align: center;"><b>CAUTION-HIGHVOLTAGE</b> 5,000 VOLT DC COLLECTOR VOLTAGE 10,000 VOLT DC IONIZER VOLTAGE</p> <p style="text-align: center; margin-top: 20px;"><b>CAPTIVE-AIRE SYSTEMS, INC.</b></p> <p style="text-align: center; font-size: small;">360 NORTHBROOK DRIVE YOUNGSVILLE, NORTH CAROLINA 27596</p> <p style="text-align: center; font-size: small;">FOR NAME OF THE NEAREST SERVICE AGENCY CALL: <b>866-784-6900</b></p>	<p style="text-align: center;"><b>ENGINEERING DATA</b></p> <p style="text-align: center;"><b>ESP SECTION</b></p> <p>CFM <input style="width: 100px;" type="text"/></p> <p>INT. STATIC PRESSURE <input style="width: 100px;" type="text"/> "W.G.</p> <p>MIN. WATER TEMP. 160°F MAX. WATER TEMP. 180°F MIN. WATER PRESSURE 60 PSIG MAX. WATER PRESSURE 80 PSIG</p> <p>ESP POWER PACK CIRCUIT:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center; font-size: small;">VOLTS</th> <th style="text-align: center; font-size: small;">PHASE</th> <th style="text-align: center; font-size: small;">HERTZ</th> <th style="text-align: center; font-size: small;">AMPS</th> <th style="text-align: center; font-size: small;">WATTS</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><input style="width: 50px;" type="text"/></td> <td style="text-align: center;"><input style="width: 50px; text-align: center; value: 1;" type="text"/></td> <td style="text-align: center;"><input style="width: 50px;" type="text"/></td> <td style="text-align: center;"><input style="width: 50px;" type="text"/></td> <td style="text-align: center;"><input style="width: 50px;" type="text"/></td> </tr> </tbody> </table> <p>MAX. FUSE SIZE <input style="width: 80px;" type="text"/> AMPS</p> <p>MAX. BREAKER SIZE <input style="width: 80px;" type="text"/> AMPS</p> <hr/> <p style="text-align: center;"><b>OPTIONAL FAN SECTION</b></p> <p>CFM <input style="width: 100px;" type="text"/></p> <p>TOTAL STATIC PRESSURE <input style="width: 100px;" type="text"/> "W.G.</p> <p>EXHAUST FAN POWER CIRCUIT:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center; font-size: small;">VOLTS</th> <th style="text-align: center; font-size: small;">PHASE</th> <th style="text-align: center; font-size: small;">HERTZ</th> <th style="text-align: center; font-size: small;">AMPS</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><input style="width: 50px;" type="text"/></td> <td style="text-align: center;"><input style="width: 50px;" type="text"/></td> <td style="text-align: center;"><input style="width: 50px;" type="text"/></td> <td style="text-align: center;"><input style="width: 50px;" type="text"/> FLA</td> </tr> </tbody> </table> <p>MIN. CIRCUIT AMPACITY <input style="width: 100px;" type="text"/></p> <p>MAX. FUSE SIZE <input style="width: 80px;" type="text"/> AMPS</p> <p>MAX. BREAKER SIZE <input style="width: 80px;" type="text"/> AMPS</p> <p style="text-align: center; font-size: x-small;">- CAUTION - THE ELECTROSTATIC CELLS SHOULD BE INSPECTED FREQUENTLY TO ENSURE THAT COLLECTED GREASE IS BEING REMOVED BY THE WASHING SYSTEM. REFER TO THE TECHNICAL MANUAL FOR SPECIFIC INSTRUCTIONS.</p> <p style="text-align: right; font-size: x-small;">FORM NO. CANP 1097</p>	VOLTS	PHASE	HERTZ	AMPS	WATTS	<input style="width: 50px;" type="text"/>	<input style="width: 50px; text-align: center; value: 1;" type="text"/>	<input style="width: 50px;" type="text"/>	<input style="width: 50px;" type="text"/>	<input style="width: 50px;" type="text"/>	VOLTS	PHASE	HERTZ	AMPS	<input style="width: 50px;" type="text"/>	<input style="width: 50px;" type="text"/>	<input style="width: 50px;" type="text"/>	<input style="width: 50px;" type="text"/> FLA
VOLTS	PHASE	HERTZ	AMPS	WATTS															
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C-ESPNAMEPLATE



## CGPC-6000-ESP TERMINAL VOLTAGES

TERMINAL	DESCRIPTION	FAN OFF	FAN ON	WASH ON	INT. FIRE	EXT. FIRE
L	Main Power Connection : Hot	120 VAC				
N	Main Power Connection : Neutral	Common				
L1	Main Power Connection : Hot <b>* Do NOT Connect Incoming Power *</b>	120 VAC				
L2	Main Power Connection : Neutral <b>* Do NOT Connect Incoming Power *</b>	Common				
1	Output to Supply Fan Motor Starter	0 VAC	120 VAC	0 VAC	0 VAC	0 VAC
2	Output to Detergent Pump	0 VAC	0 VAC	120 VAC	0 VAC	0 VAC
3	Thermostat Return	0 VAC	0 VAC	0 VAC	24 VAC	0 VAC
4	Fused Supply to PLC Outputs & Etc.	120 VAC	120 VAC	120 VAC	120 VAC	120 VAC
5	120 VAC Neutral Leg	High Voltage Common				
8	Output to Exhaust Fan Motor Starter	0 VAC	120 VAC	0 VAC	0 VAC	120 VAC
CM	Output to Cold Water Mist Solenoid	0 VAC	120 VAC	0 VAC	0 VAC	120 VAC
9	Output to Wash Solenoid Valve #1	0 VAC	0 VAC	120 VAC	120 VAC	120 VAC
10	Output to Wash Solenoid Valve #2	0 VAC	0 VAC	120 VAC	120 VAC	120 VAC
11	Output to Wash Solenoid Valve #3	0 VAC	0 VAC	120 VAC	120 VAC	120 VAC
12	Output to Wash Solenoid Valve #4	0 VAC	0 VAC	120 VAC	120 VAC	120 VAC
13	Output to Wash Solenoid Valve #5	0 VAC	0 VAC	120 VAC	120 VAC	120 VAC
SF1 SF2	N.O. Dry Contacts for Supply Fan Remote Control Center	Open	Closed	Open	Open	Open
EF1 EF2	N.O. Dry Contacts for Exhaust Fan Remote Control Center	Open	Closed	Open	Open	Closed
A1 A2	N.O. Dry Contacts for Interface to Building Fire Alarm / Monitor System	Open	Open	Open	Closed	Closed
Q1 Q2	N.C. Dry Contacts for Interface to Fire System Fuel Shutoff Control	Closed	Closed	Closed	Open	Open
FS	Input from Remote Fire Switch	0 VAC	0 VAC	0 VAC	0 VAC	120 VAC
(1) LD	Input from Detergent Flow Switch	NO Low Detergent Sensor (Jumper J1 is present)				
		120 VAC	120 VAC	120 VAC	120 VAC	120 VAC
(2) LD	Input from Detergent Flow Switch	Low Detergent Sensor (Jumper J1 is cut or NOT present)				
		0 VAC	0 VAC	0 VAC	0 VAC	0 VAC
GX	Power for <u>GX2</u> Damper Actuators	0 VAC	24 VAC	0 VAC	0 VAC	24 VAC
15	Output to Thermostat(s)	24 VAC	24 VAC	24 VAC	24 VAC	24 VAC
17	24 VAC Common	Low Voltage Common				
18	<u>CG3</u> Damper Drive Signal	24 VAC	0 VAC	24 VAC	0 VAC	0 VAC
19	Power for <u>CG3</u> Damper Actuators	24 VAC	24 VAC	24 VAC	0 VAC	24 VAC
GXT	Thermostat Return for GX2 Hoods	24 VAC	24 VAC	24 VAC	0 VAC	24 VAC
LC	Low Odor Control Chemical Input	0 VAC	120 VAC	0 VAC	0 VAC	120 VAC

- (1) 120 VAC - Jumper is installed between LD and #4 or Jumper J1 is present (No LD/Detergent Flow Switch present)
- (2) 120 VAC - LD (Detergent Flow Switch) is installed and Detergent Pump is running and Detergent is present  
 0 VAC - LD (Detergent Flow Switch) is installed and Detergent Pump is running and Detergent is NOT present

## CGPC-6000-ESP TERMINAL VOLTAGES

TERMINAL	DESCRIPTION	FAN OFF	FAN ON	WASH ON	INT. FIRE	EXT. FIRE
(3) 3R	Thermostat Return - ClearAir Unit	0 VAC	0 VAC	0 VAC	120 VAC (NOTE 3)	0 VAC
4R	Fused Supply to ClearAir Unit	120 VAC				
5R	120 VAC Neutral Leg to ClearAir Unit	High Voltage Common				
6R	Switched Power for Power Packs	0 VAC	120 VAC	0 VAC	0 VAC	120 VAC
8R	Control Voltage to Mag Starter	0 VAC	120 VAC	0 VAC	0 VAC	120 VAC
A	Cell Status Light Input	0 VAC	120 VAC	0 VAC	0 VAC	120 VAC
B	Cell Status Light Input	0 VAC	120 VAC	0 VAC	0 VAC	120 VAC
C	Cell Status Light Input	0 VAC	120 VAC	0 VAC	0 VAC	120 VAC
D	Cell Status Light Input	0 VAC	120 VAC	0 VAC	0 VAC	120 VAC
E	Cell Status Light Input	0 VAC	120 VAC	0 VAC	0 VAC	120 VAC
F	Cell Status Light Input	0 VAC	120 VAC	0 VAC	0 VAC	120 VAC
G	Cell Status Light Input	0 VAC	120 VAC	0 VAC	0 VAC	120 VAC
H	Cell Status Light Input	0 VAC	120 VAC	0 VAC	0 VAC	120 VAC
21	Supply to Outputs	24 VDC	24 VDC	24 VDC	24 VDC	24 VDC
22	Disable Wash Solenoids During an Int. or Ext. Fire Mode Jumper (OPTIONAL)	24 VDC INPUT TO TERMINAL 22 IF USED				
23	Input - Wash Start Permission From a Remote Location (OPTIONAL)	24 VDC INPUT TO TERMINAL 23 IF USED.				
24	Input - Start Fan Signal From a Remote Location (OPTIONAL)	24 VDC INPUT TO TERMINAL 24 WILL INITIATE THE FAN ON MODE				
25	Input - Start Wash Signal From a Remote Location (OPTIONAL)	24 VDC INPUT TO TERMINAL 25 WILL INITIATE THE WASH ON MODE				
(1) 26	Input - Low Detergent Signal Sub Panel / ESP Washes	NO Low Detergent Sensor (Jumper is present)				
		120 VAC	120 VAC	120 VAC	120 VAC	120 VAC
(2) 26	Input - Low Detergent Signal Sub Panel / ESP Washes	Low Detergent Sensor Installed				
		0 VAC	0 VAC	0 VAC	0 VAC	0 VAC
27	Input - Start Fan / Start Wash Signal From a Remote Location	FAN ON 24VDC SIGNAL LOSS OF 24VDC SIGNAL WILL PUT CONTROL INTO A WASH MODE				
28	Output - Detergent Pump #2 Sub Panel / ESP	0 VAC	0 VAC	120 VAC	0 VAC	0 VAC
29	Output to Wash Solenoid Valve #6	0 VAC	0 VAC	120 VAC	120 VAC	120 VAC
30	Output to Wash Solenoid Valve #7	0 VAC	0 VAC	120 VAC	120 VAC	120 VAC
31	Output to Wash Solenoid Valve #8	0 VAC	0 VAC	120 VAC	120 VAC	120 VAC
32	Output to Wash Solenoid Valve #9	0 VAC	0 VAC	120 VAC	120 VAC	120 VAC
33	Output to Wash Solenoid Valve #10	0 VAC	0 VAC	120 VAC	120 VAC	120 VAC
34	Output to Wash Solenoid Valve #11	0 VAC	0 VAC	120 VAC	120 VAC	120 VAC
35	Output to Wash Solenoid Valve #12	0 VAC	0 VAC	120 VAC	120 VAC	120 VAC
36	Output to Wash Solenoid Valve #13	0 VAC	0 VAC	120 VAC	120 VAC	120 VAC
SD	Solenoid Drain	0 VAC	0 VAC	120 VAC	120 VAC	120 VAC

-1 120 VAC - Jumper is installed between LD and #26 (No LD/Detergent Flow Switch present)

(2) 120 VAC- LD (Detergent Flow Switch) is installed and Detergent Pump is running and Detergent is present  
 0 VAC - LD (Detergent Flow Switch) is installed and Detergent Pump is running and Detergent is NOT present

-3 120 VAC - The only time that terminal 3R will be energized with 120 VAC is if a thermostat located in the RSPC-ESP unit is activated

# CGPC-6000-ESP INTERNAL WIRING DIAGRAM

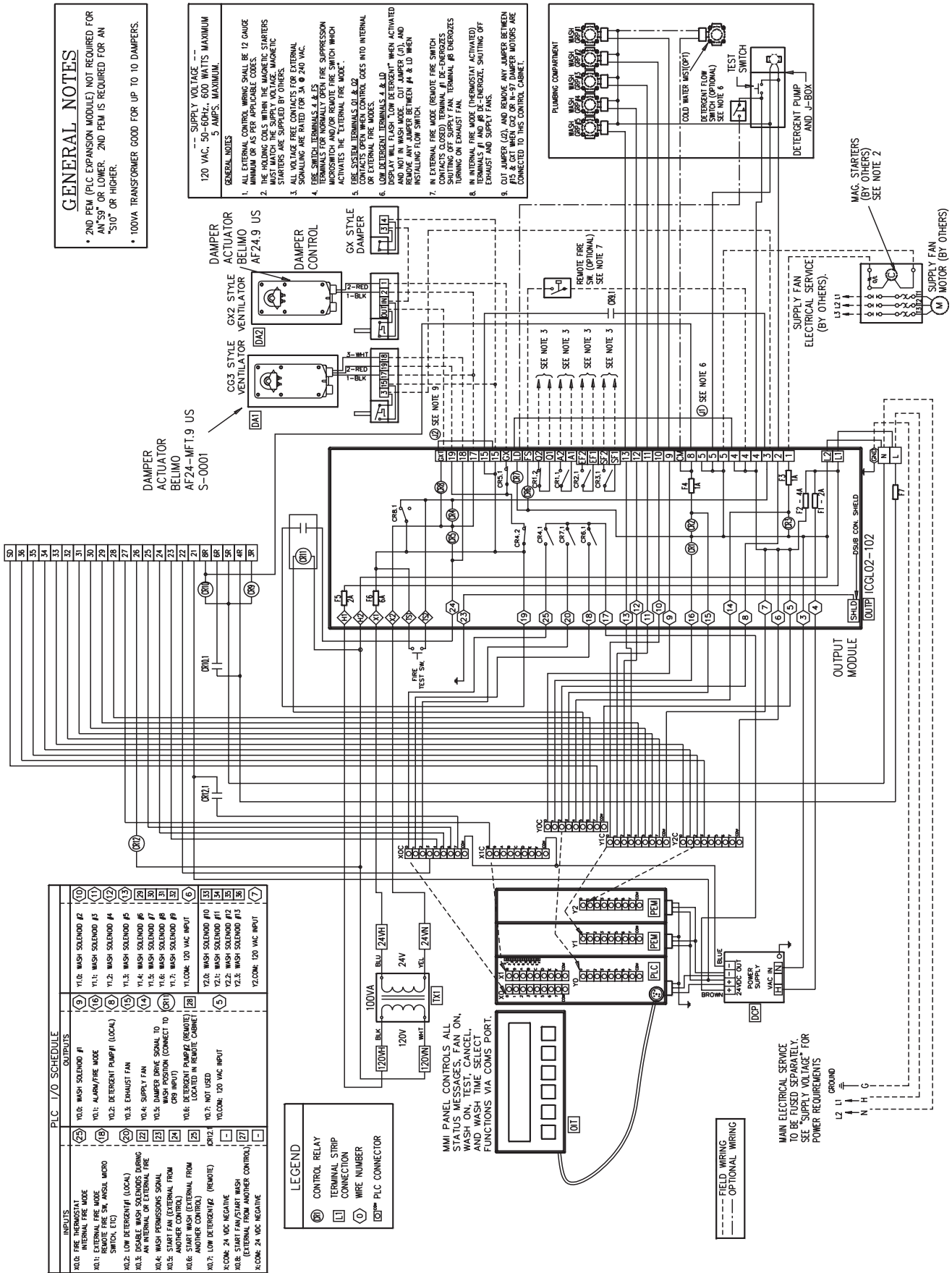
## GENERAL NOTES

- \* 2ND PEM (PLC EXPANSION MODULE) NOT REQUIRED FOR AN "S9" OR LOWER. 2ND PEM IS REQUIRED FOR AN "S10" OR HIGHER.
- \* 100VA TRANSFORMER GOOD FOR UP TO 10 DAMPERS.

120 VAC, 50-60HZ, 600 WATTS MAXIMUM  
5 AMPS, MAXIMUM

### GENERAL NOTES

1. ALL EXTERNAL CONTROL WIRING SHALL BE 12 GAUGE MINIMUM OR AS PER APPLICABLE CODES.
2. THE HOLDING COILS WITHIN THE MAGNETIC STARTERS AND CONTACTORS ARE SUPPLIED BY CONECS.
3. ALL VOLTAGE FREE CONTACTS FOR EXTERNAL SIGNALING ARE RATED FOR 3A @ 240 VAC.
4. FIRE SWITCH TERMINALS 4 & 4S ACTIVATES THE EXTERNAL FIRE MODE MICROSWITCH AND/OR REMOTE FIRE SWITCH WHICH ACTIVATES THE EXTERNAL FIRE MODE.
5. EXTERNAL TERMINALS FOR EXTERNAL FIRE MODE OR EXTERNAL FIRE MODES.
6. LOW DETERGENT TERMINALS 4 & 4S DISPLAY WILL FLASH "LOW DETERGENT" WHEN ACTIVATED AND NOT WASHABLE BEWASHEN #4 & 4S WHEN INSTALLING FLOW SWITCH.
7. IN EXTERNAL FIRE MODE (REMOTE FIRE SWITCH CONTACTS CLOSED) TERMINAL #1 DE-ENERGIZES SHUTTING OFF SUPPLY FAN. TERMINAL #8 ENERGIZES EXHAUST AND SUPPLY FAN.
8. IN INTERNAL FIRE MODE (THERMOSTAT ACTIVATED) TERMINAL #1 DE-ENERGIZES EXHAUST AND SUPPLY FAN.
9. OUT LAMPS (L) AND PROBE ANY LAMPS BETWEEN #15 & #17 WASH #20 OR #4-9 DAMPER MOTORS ARE CONNECTED TO THIS CONTROL CABINET.



PLC I/O SCHEDULE	
<b>INPUTS</b>	<b>OUTPUTS</b>
X0.0: FIRE INTERNAL FIRE MODE	Y1.0: WASH SOLENOID #1
X0.1: EXTERNAL FIRE MODE SWITCH, ETC)	Y1.1: WASH SOLENOID #2
X0.2: LOW DETERGENT (LOCAL)	Y1.2: WASH SOLENOID #4
X0.3: DISABLE WASH SOLENOIDS DURING AN INTERNAL OR EXTERNAL FIRE	Y1.3: WASH SOLENOID #6
X0.4: WASH PERMISSIONS SIGNAL	Y1.4: WASH SOLENOID #7
X0.5: START FAN (EXTERNAL FROM ANOTHER CONTROL)	Y1.5: WASH SOLENOID #8
X0.6: LOW DETERGENT (REMOTE)	Y1.6: WASH SOLENOID #9
X0.7: LOW DETERGENT (REMOTE)	Y1.00M: 120 VAC INPUT
X0.00M: 24 VDC NEGATIVE	Y1.00M: 120 VAC INPUT
X0.00M: 24 VDC NEGATIVE	Y1.00M: 120 VAC INPUT
X0.00M: 24 VDC NEGATIVE	Y1.00M: 120 VAC INPUT

LEGEND	
(R)	CONTROL RELAY
(S)	TERMINAL STRIP CONNECTION
(W)	WIRE NUMBER
(C)	PLC CONNECTOR

MAIN ELECTRICAL SERVICE TO BE FUSED SEPARATELY. SEE SUPPLY VOLTAGE FOR POWER REQUIREMENTS

# OPTIONAL CONNECTION INSTRUCTIONS

## **Option #1: Disable wash solenoid during an Internal or External Fire.**

This action can be performed By Installing a Jumper wire between Terminal 21 and 22. This is a 24VDC connection. This option has been installed in the case the local codes or if the Fire Marshal has specified that the water wash in the hood plenum or the ESP unit can not turn on in the event of an Internal or External Fire Mode.

## **Option #2: Start Wash Permission from a remote location.**

This option is to be used if the CGPC-6000-ESP control is to communicate with the building management system or any other system/ control that has control over the fan. The exhaust fan must be shut down when the wash is running, if the CGPC-6000-ESP control must wait until the whole system is shut down to start washing then connect terminals 21 and 23 to a set of voltage free N/C contacts that open when the wash can start. Example of operation: If the wash button has been pressed or the time clock has activated the wash sequence the CGPC-6000-ESP control will call for the fan to be off by taking the power off of terminals 8 and 5 or opening the contacts between EF1 and EF2. Next, the CGPC-6000-ESP control will sit idle until the contacts at the building management system open. Then the CGPC-6000-ESP control will start the wash cycle.

## **Option #3: Start Fan Signal from a remote location.**

If the CGPC-6000-ESP control is controlled by the building management system or another control cabinet that initiates the fan run signal. This can be accomplished by connecting a set

of N/O voltage free contacts that close when the fan should be on, and open when the fan should be off to terminals 21 and 24 in the CGPC-6000-ESP control panel. This will not Initiate the wash mode when the contacts open. This option should be used in conjunction with option #4 Start wash signal from a remote location. If the wash must start when the Contacts Open then use option #5.

## **Option #4: Start Wash Signal from a remote location.**

If the CGPC-6000-ESP control is controlled by the building management system or another control cabinet that initiates the wash on signal. This can be accomplished by connecting a set of N/O voltage free contacts that close when the wash should be on and open when the fan should be on,( Note this contact closure should be a momentatily closure) to terminals 21 and 25 in the CGPC-6000-ESP control panel. This will not Initiate the fan mode when the contacts open. This option should be used in conjunction with option #3 Start Fan signal from a remote location. If the wash must start when the contacts open then use option #5. (Note: Once the wash has started the fan will not turned back on until the wash is finished.)

## **Option #5: Start Fan/Start Wash Signal from a remote location.**

If the CGPC-6000-ESP control is controlled by the building management system or another control cabinet that initiates the fan on /wash on signal then connect a set of dry contacts that close if the fan should be on and open when the wash is to start to terminals 21 and 27. These contacts should stay open until the fan should start. (Note: Once the wash has started the fan will not turn back on until the wash is finished.)

# CGPC-6000-ESP PLC STATUS LIGHTS

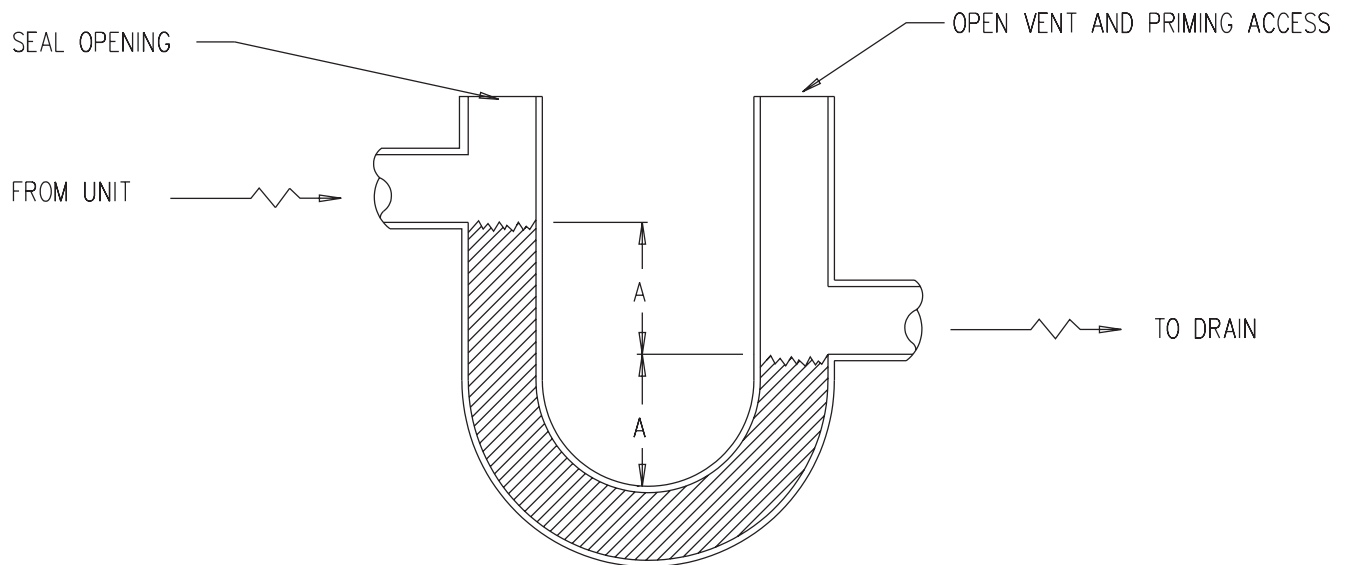
STANDARD (SINGLE OR SEQUENTIAL WASH) DESCRIPTION - PLC		
X (Inputs)	DESCRIPTION OF PLC STATUS LIGHTS	GENERAL DESCRIPTION
0	<b>On</b> while "Fire Test Switch" is pushed and held, or hood is in Internal Fire Mode. <b>Off</b> during "Cool Down Cycle".	Internal Fire Mode
1	<b>On</b> when Break Glass Pull Station is activated, or when hood is in External Fire Mode.	External Fire Mode (Remote Fire Switch)
2	<b>On</b> normally. It shuts <b>off</b> if cabinet is equipped with Low Detergent alert feature and the detergent is low.	Low Detergent (Local)
3	<b>Off</b> normally. <b>On</b> when Jumper is installed to disable Wash Solenoids from opening during Internal Fire Mode and External Fire Modes.	Disable Wash Solenoids during an Internal or External Fire
4	<b>Off</b> normally. <b>On</b> when Jumper is installed to enable Wash Permission Signal.	Wash Permission Signal
5	<b>On</b> when signal from External Control is sent to Start Fan	Start Fan (External)
6	<b>On</b> when signal from External Control is sent to Start Wash	Start Wash (External)
7	<b>On</b> normally. It shuts <b>off</b> if cabinet is equipped with Low Detergent alert feature and the detergent is low.	Low Detergent (Remote)
8	<b>On</b> when signal from External Control is sent to Start Fan	Start Fan/Start Wash (External)
9	Not Used	
A	Not Used	
B	Not Used	
C	Not Used	
D	Not Used	
E	Not Used	
F	Not Used	
Y (Outputs)	DESCRIPTION OF PLC STATUS LIGHTS	GENERAL DESCRIPTION
0	<b>On</b> when Wash Solenoid # 1 should be open.	Wash Solenoid #1
1	<b>On</b> during an Internal or External Fire Mode. <b>On</b> during "Cool Down Cycle".	Alarm / Fire Mode
2	<b>On</b> when Detergent Pump (Local) should be on.	Detergent Pump (Local)
3	<b>On</b> when Exhaust Fan should be on.	Exhaust Fan
4	<b>On</b> when Supply Fan should be on.	Supply Fan
5	<b>On</b> when damper is in "Wash" position, or while damper is moving to "Wash" position	Damper Drive Signal to Wash Position
6	<b>On</b> when Detergent Pump (Remote) should be on.	Detergent Pump (Remote)
7	Not Used	
COM	Never comes on	

(SEQUENTIAL WASH "S2-S9") DESCRIPTION - EXPANSION MODULE #1		
Y (Outputs)	DESCRIPTION OF STATUS LIGHTS	GENERAL DESCRIPTION
0	On when Wash Solenoid # 2 should be open.	Wash Solenoid #2
1	On when Wash Solenoid # 3 should be open.	Wash Solenoid #3
2	On when Wash Solenoid # 4 should be open.	Wash Solenoid #4
3	On when Wash Solenoid # 5 should be open.	Wash Solenoid #5
4	On when Wash Solenoid # 6 should be open.	Wash Solenoid #6
5	On when Wash Solenoid # 7 should be open.	Wash Solenoid #7
6	On when Wash Solenoid # 8 should be open.	Wash Solenoid #8
7	On when Wash Solenoid # 9 should be open.	Wash Solenoid #9
COM	Never comes on	

(SEQUENTIAL WASH "S10-S13") DESCRIPTION - EXPANSION MODULE #2		
Y (Outputs)	DESCRIPTION OF STATUS LIGHTS	GENERAL DESCRIPTION
0	On when Wash Solenoid # 10 should be open.	Wash Solenoid #10
1	On when Wash Solenoid # 11 should be open.	Wash Solenoid #11
2	On when Wash Solenoid # 12 should be open.	Wash Solenoid #12
3	On when Wash Solenoid # 13 should be open.	Wash Solenoid #13
4	Not Used	
5	Not Used	
6	Not Used	
7	Not Used	

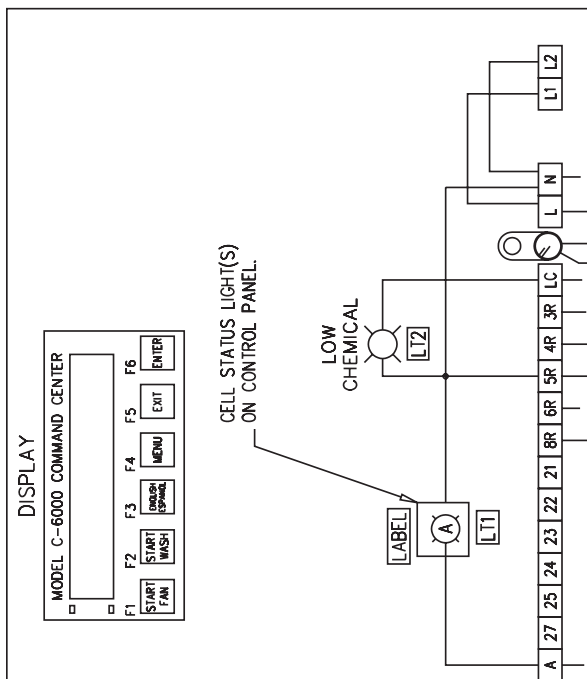
# C-ESP DRAIN

A (MINIMUM) = MAXIMUM EXPECTED PRESSURE IN INCHES WATER GAUGE PLUS 1"

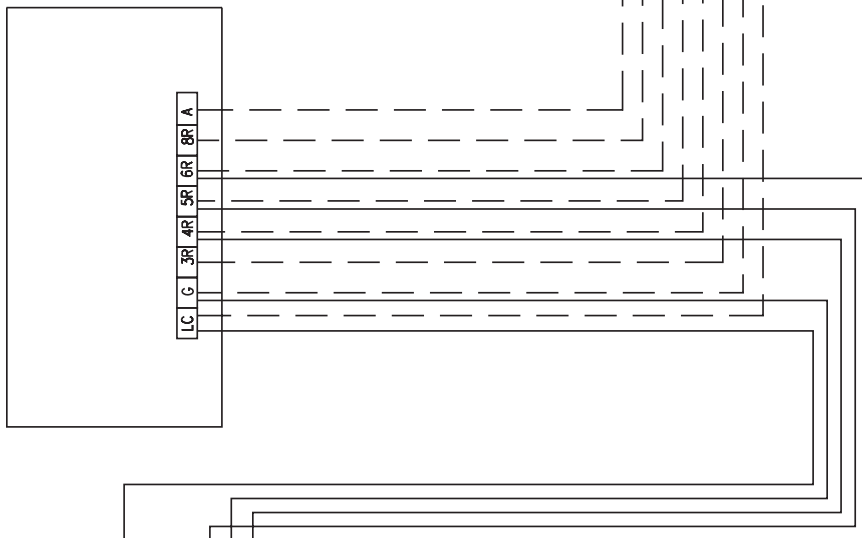


RECOMMENDED TRAP LOCATED ON NEGATIVE SIDE OF FAN

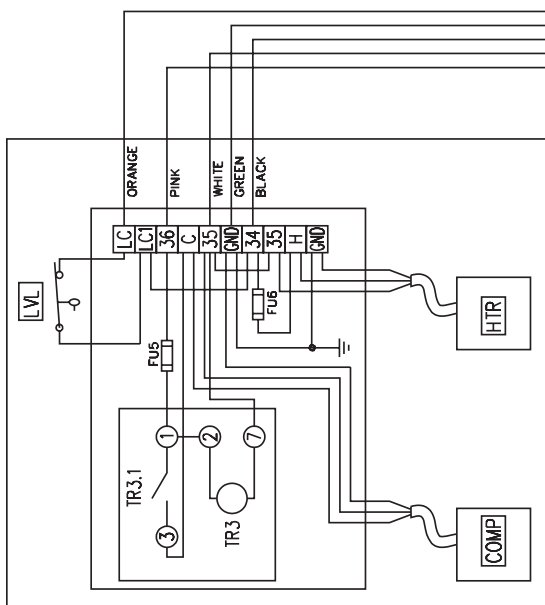
## CONTROL CABINET SERIES GPC-6000-ESP (120 VAC)



## C-ESP POWER PACK ELECTRICAL COMPARTMENT



## SP0 SPRAY ODOR CABINET



120 VAC MAIN ELECTRICAL SERVICE, MUST BE FUSED SEPARATELY.

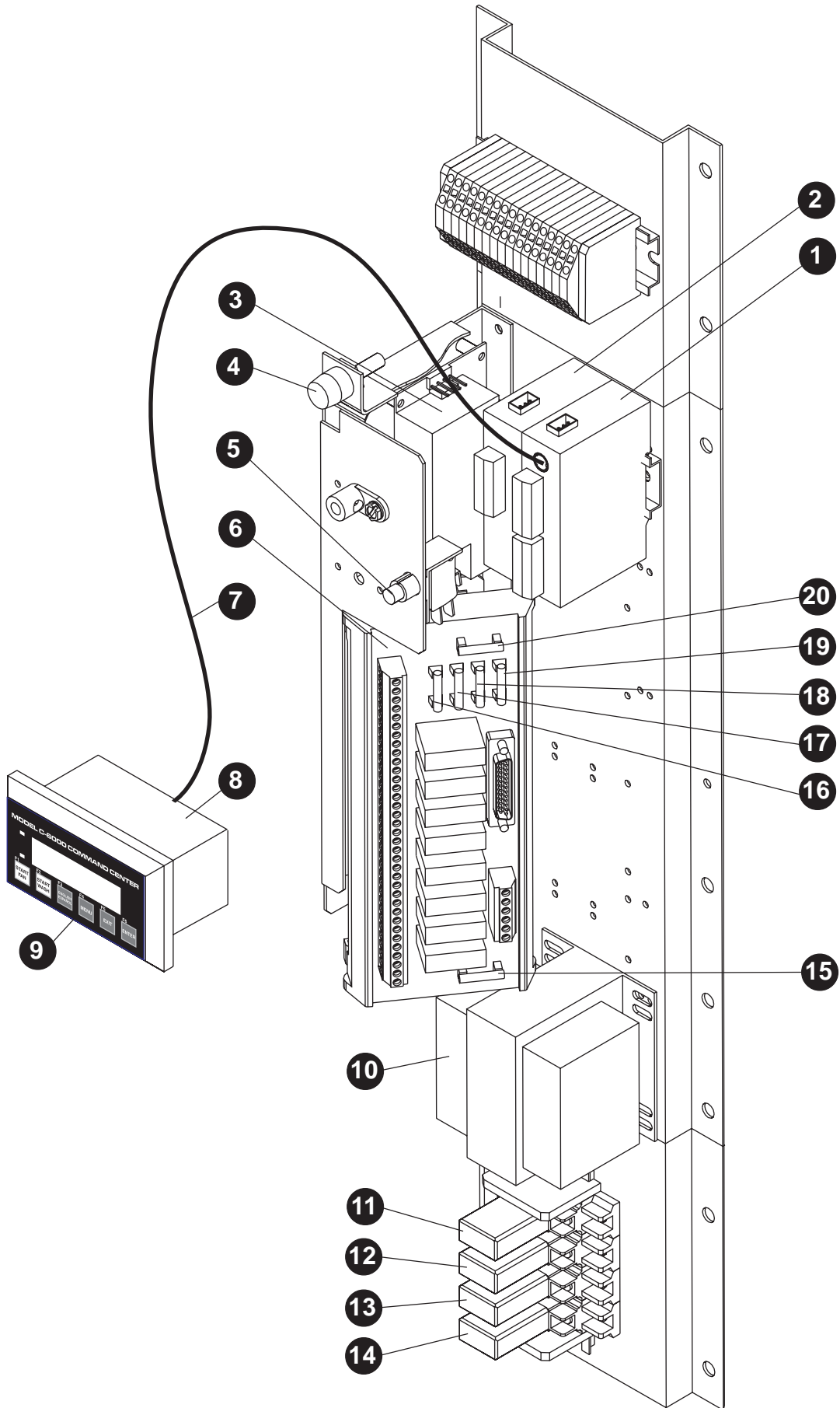
## SPRAY ODOR TERMINAL VOLTAGES

TERMINAL	DESCRIPTION	FAN OFF	FAN ON	WASH ON	INT. FIRE	EXT. FIRE
LC	Low Odor Control Chemical Output	120 VAC when Chemical is Low				
LC1	Low Odor Control: Hot	120 VAC				
34	Fused Supply to Spray Odor Heater	120 VAC				
35	Neutral for Spray Odor	Common				
36	Spray Odor Power	0 VAC	120 VAC	0 VAC	0 VAC	0 VAC
C	Compressor Power	0 VAC	0 VAC	120 VAC	0 VAC	0 VAC
H	Heater Power	0 VAC	0 VAC	0 VAC	24 VAC	0 VAC



# MODEL CGPC-6000-ESP SERIES CONTROL

## 1-3 TRANSFORMERS



# CGPC-6000-ESP COMPONENT SCHEDULE

Component Schedule (1-3 Transformers/High Voltage Power Supplys)				
PC. NO.	DESCRIPTION	PART NO.	MFG PART NO.	
1	Programmable Logic Controller (PLC) w/ program	75872		
*	2	Expansion Module	18866	
	3	24VDC Power Supply	18863	
	4	Fuse (F7) - Size Varies		
	5	Fire Test Switch	16894	
	6	C-6000-B Output Module	18983	
	7	PLC to Operator Interface Cable	18868	
	8	Operator Interface w/ program & Mylar Label	75871	
	9	Operator Interface Mylar Label	19010	
	10	100 VA Transformer <span style="float: right;">[C-6000-10]</span>	18981	
		250 VA Transformer <span style="float: right;">[C-6000-20]</span>	18891	
	11	Control Relay - SPDT (CR9) <b>ESP Fire Signal</b>	11399	
		Socket - SPDT	11413	
	12	Control Relay - SPDT (CR10) <b>ESP Transformer Power</b>	11399	
		Socket - SPDT	11413	
	13	Control Relay - SPDT (CR11) <b>Damper Actuator Output</b>	11399	
		Socket - SPDT	11413	
	14	Control Relay - SPDT (CR12) <b>Remote Low Detergent</b>	11399	
		Socket - SPDT	11413	
	15	Fuse (F6) - 6 Amp <b>Transformer - Secondary</b>	19020	BUSS AGC-6
	16	Fuse (F1) - 2 Amp <b>24VDC Power Supply</b>	13062	BUSS AGC-2
	17	Fuse (F2) - 4 Amp <b>PLC - 120 VAC</b>	10039	BUSS AGC-4
	18	Fuse (F3) - 1 Amp <b>Supply Fan Mag. Starter</b>	19027	BUSS MDL-1
	19	Fuse (F4) - 1 Amp <b>Exhaust Fan Mag. Starter</b>	19027	BUSS MDL-1
	20	Fuse (F5) - 2 Amp <b>[C-6000-10] Trans. - Primary</b>	13062	BUSS AGC-2
		Fuse (F5) - 2 Amp <b>[C-6000-20] Trans. - Primary</b>	10039	BUSS AGC-4
	**	21	High Voltage Light - Green (Not Shown)	12512
		22	Cable Assembly (Not Shown)	18864
		23	Flash Guard (Not Shown)	18877

Optional - Spray Odor Low Chemical Light			
24	Low Odor Control Chem. Label (Not Shown)	19154	
25	Indicator Light - Red (Not Shown)	30527	

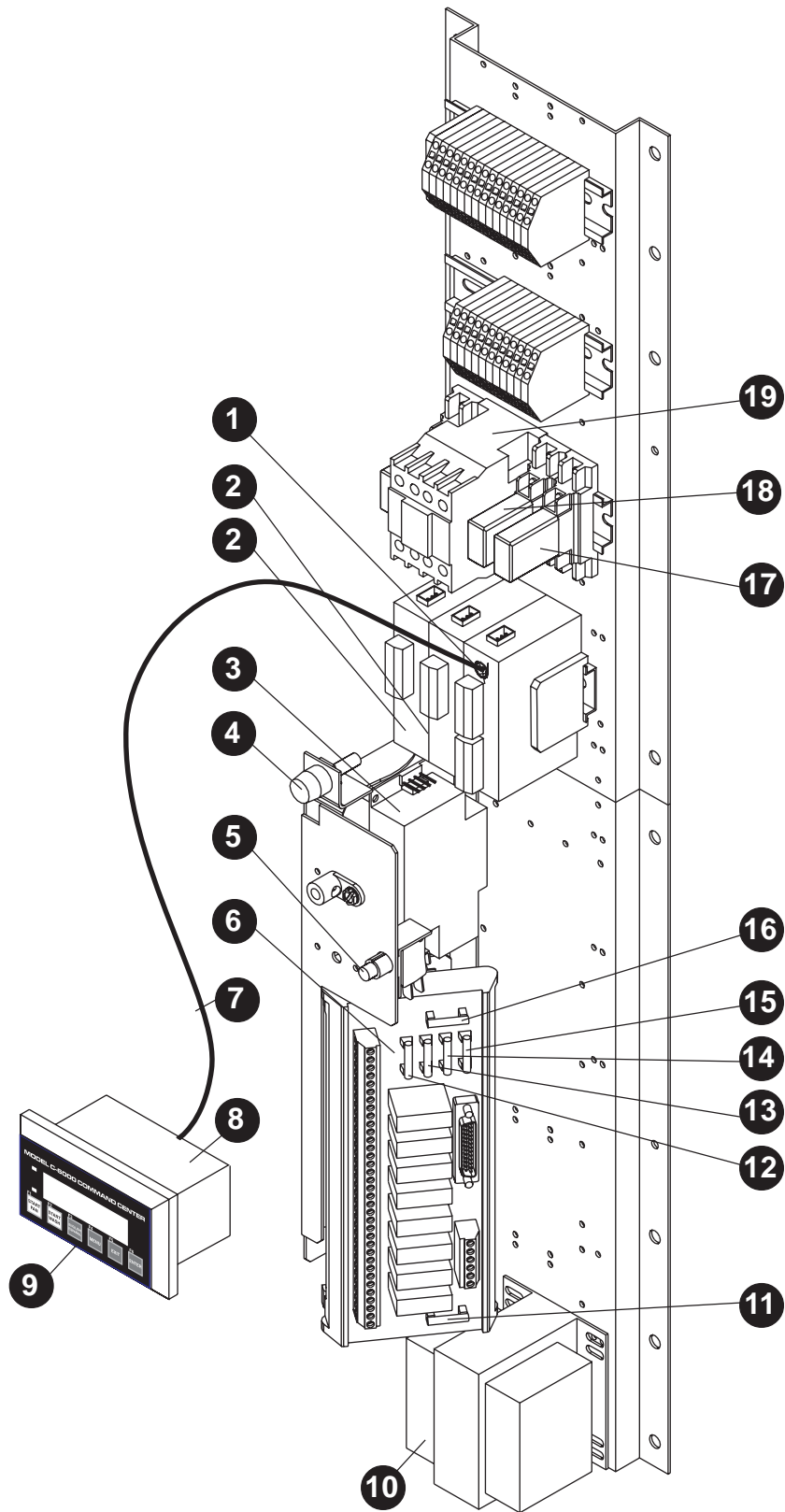
**NOTES:**

\* Two (2) Expansion Modules are required for 10-13 Wash Solenoids

\*\* 1 to 8 depending on number of High Voltage Transformers/Power Supplies

# MODEL CGPC-6000-ESP SERIES CONTROL

## 4 OR MORE TRANSFORMERS



# CGPC-6000-ESP COMPONENT SCHEDULE

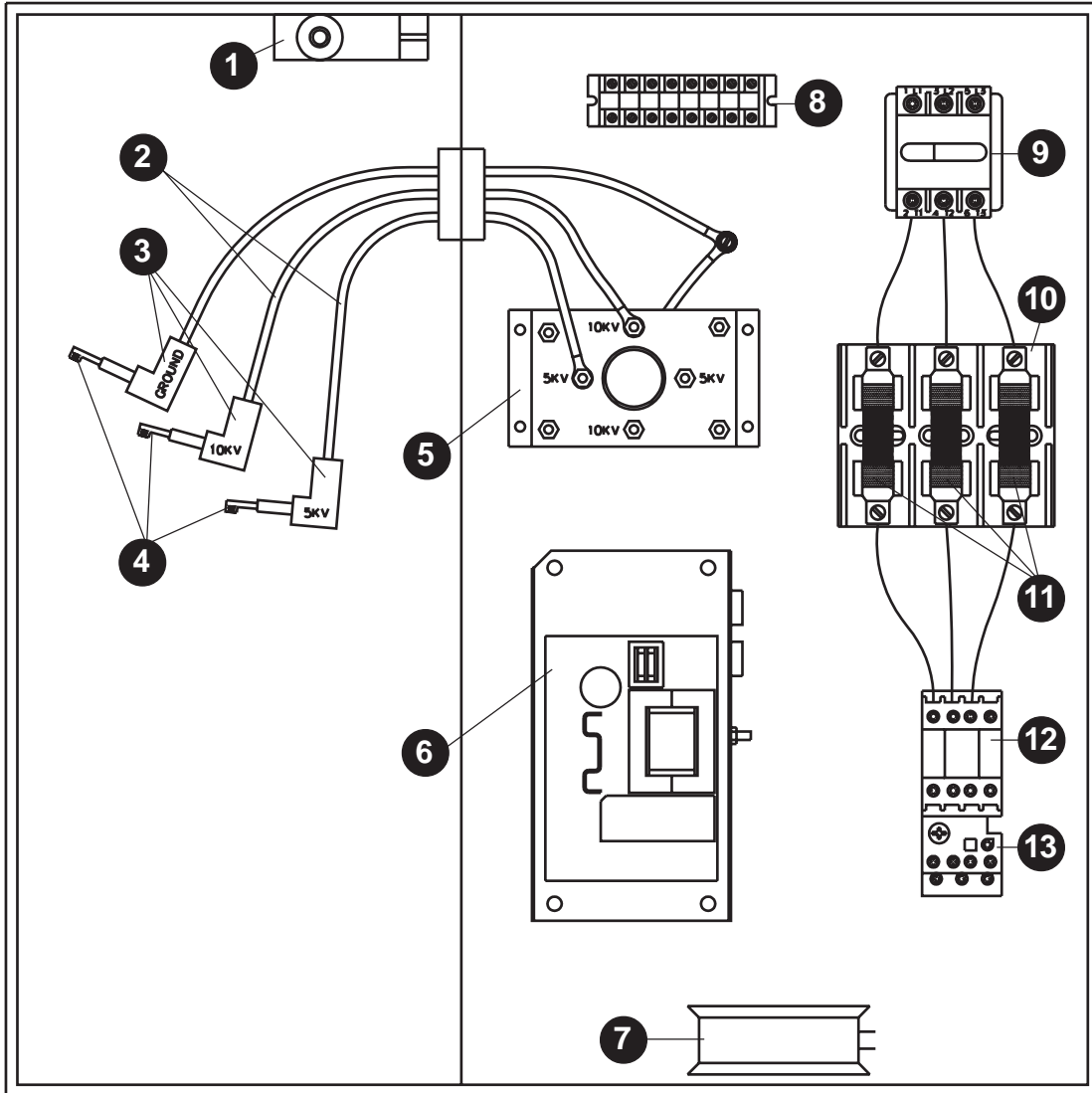
<b>Component Schedule (4 or More Transformers/High Voltage Power Supplies)</b>			
<b>PC. NO.</b>	<b>DESCRIPTION</b>	<b>PART NO.</b>	<b>MFG PART NO.</b>
1	Programmable Logic Controller (PLC) w/ program	75872	
2	Expansion Module	18866	
3	24VDC Power Supply	18863	
4	Fuse (F7) - Size Varies		
5	Fire Test Switch	16894	
6	C-6000-B Output Module	18983	
7	PLC to Operator Interface Cable	18868	
8	Operator Interface w/ program & Mylar Label	75871	
9	Operator Interface Mylar Label	19010	
10	100 VA Transformer <b>[C-6000-10]</b>	18981	
	250 VA Transformer <b>[C-6000-20]</b>	18891	
11	Fuse (F6) - 6 Amp <b>Transformer - Secondary</b>	19020	BUSS AGC-6
12	Fuse (F1) - 2 Amp <b>24VDC Power Supply</b>	13062	BUSS AGC-2
13	Fuse (F2) - 4 Amp <b>PLC - 120 VAC</b>	10039	BUSS AGC-4
14	Fuse (F3) - 1 Amp <b>Supply Fan Mag. Starter</b>	19027	BUSS MDL-1
15	Fuse (F4) - 1 Amp <b>Exhaust Fan Mag. Starter</b>	19027	BUSS MDL-1
16	Fuse (F5) - 2 Amp <b>[C-6000-10] Trans. - Primary</b>	13062	BUSS AGC-2
	Fuse (F5) - 2 Amp <b>[C-6000-20] Trans. - Primary</b>	10039	BUSS AGC-4
17	Control Relay - SPDT (CR9) <b>ESP Fire Signal</b>	11399	
	Socket - SPDT	11413	
18	Control Relay - SPDT (CR10) <b>ESP Transformer Power</b>	11399	
	Socket - SPDT	11413	
19	Contactors (CR11) <b>Damper Actuator Output</b>	16633	
20	Control Relay - SPDT (CR12) <b>Remote Low Detergent</b>	11399	
	Socket - SPDT	11413	
21	High Voltage Light - Green (Not Shown)	12512	
22	Cable Assembly (Not Shown)	18864	
23	Flash Guard (Not Shown)	18877	

<b>Optional - Spray Odor Low Chemical Light</b>			
24	Low Odor Control Chem. Label (Not Shown)	19154	
25	Indicator Light - Red (Not Shown)	30527	

**NOTES:**

- \* Two (2) Expansion Modules are required for 10-13 Wash Solenoids
- \*\* 1 to 8 depending on number of High Voltage Transformers/Power Supplies

# C-ESP POWER PACK – PARTS

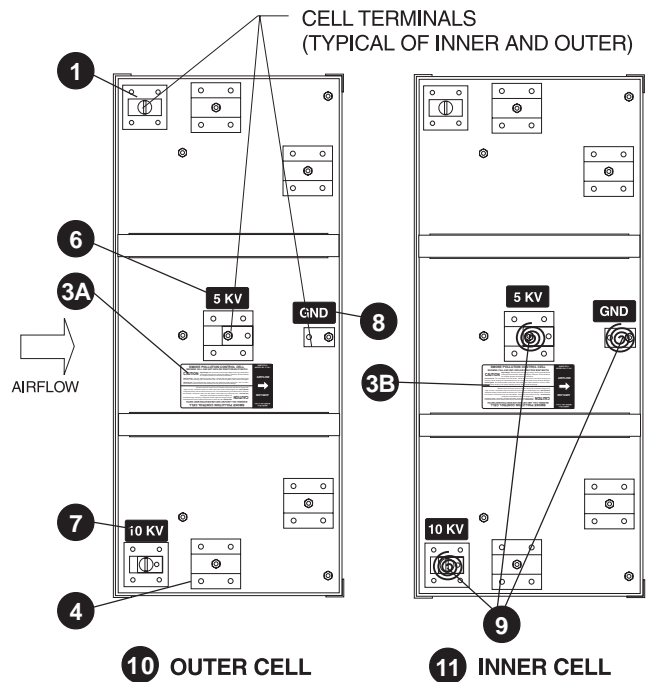
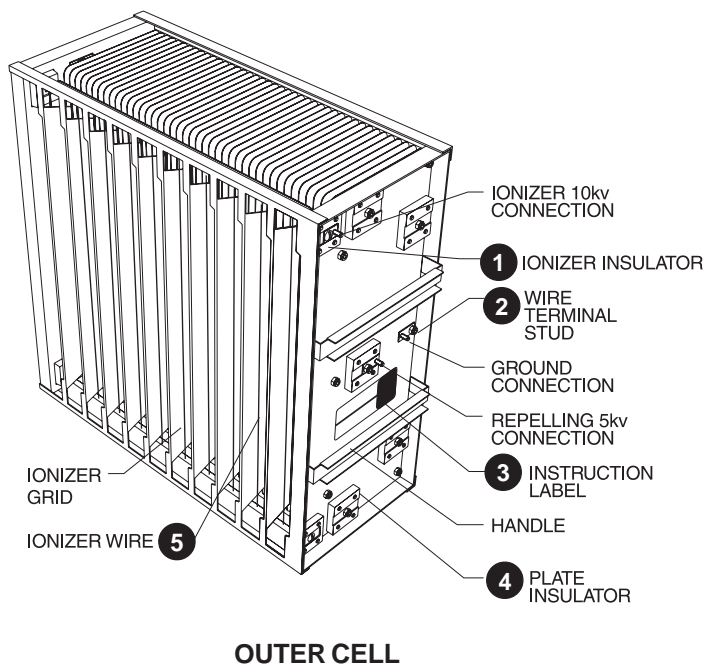


PC. NO.	DESCRIPTION	PART NO.	
1	Cell Door Access Safety Switch	30431	
2	18 Gage High Voltage Cable (RED), Per 6' Strips, Specify Length	15228	
3	Terminal Clip Cover For Cells, 90° Rubber Boot	10332	
4	Spark Plug, Terminal Connectors (5 Per Pack)	10335	
5	Electrical Compartment Cell plunger Safety Switch	12798	
6	High Voltage Transformer/Power Supply [1-2]	12405	
	High Voltage Transformer/Power Supply [3-4]	16514	
7	Cooling Fan	30424	
8	Terminal Blocks	16238	
*	9	Disconnect Switch	Varies
*	10	3 Fuse, Fuse Holder	Varies
*	11	Fuses	Varies
*	12	Motor Starter	Varies
*	13	Overload Relay	Varies
**	14	High Voltage Light (Green) (NOT SHOWN)	12512

**NOTES:**

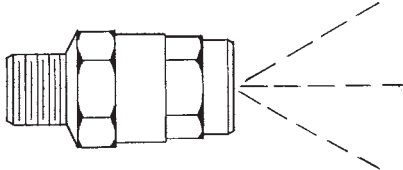
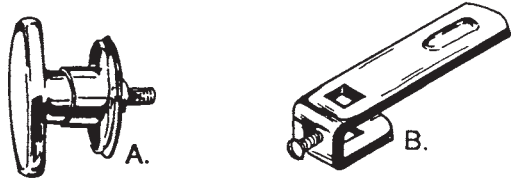
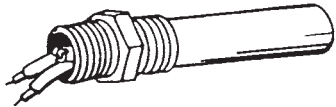
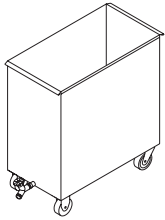
- \* See Unit Specific wiring diagram for sizes and part numbers
  - \*\* 1 to 8 depending on number of High Voltage Transformers/Power Supplies.
- Lights Not Shown, Located On The Power Pack Door.**

# ESP CELL – PARTS



PC. NO.	DESCRIPTION	PART NUMBER
1	Ionizer Insulator	14745
2	Wire Terminal Stud	14753
3A	Instruction Label - Outer Cell [RED]	16846
3B	Instruction Label - Inner Cell [BLUE]	16844
4	Plate Insulator	11239
5	Ionizer Wire	10338
6	5 kV Label	16999
7	10 kV Label	17000
8	Ground Label	16998
9	Inner Cell Coil Springs	11301
10	Outer Cell - Complete	12795
11	Inner Cell - Complete	12796

# PARTS - MISCELLANEOUS

PART NUMBER	DESCRIPTION	ILLUSTRATION
10301	SPC Nozzle	
10308 10309	Door Handle A. Handle Complete B. Tongue Only	
18465	Thermostat 12" Length (250° F) Normally open	
12801 12800	Soak Tank (24" cells) Soak Tank (16" cells)	
11118	Lift & Turn Latch Access Doors	
12301	Screw Latch ESP/Power Pack Doors	
12302	CAM (Tongue)	

## C - ESP STARTUP INSTRUCTIONS

### Start up Procedure for C-ESP

Check duct work for proper connection to unit. All incoming duct work should be minimum 18 GA SS or 16 GA BI and fully welded or joined per NFPA 96 requirements

Check the fan section and remove shipping braces if supplied per the instructions on pages 38 and 39.

If the unit was shipped in sections. Check for proper assembly of the unit on pages 14 and 15. All field joints must be welded grease and water tight.

Check for proper and complete installation of all filters. If some are missing locate them and install them.

If a media bed odor control system was provided make sure that it was installed per the instructions on pages 34 and 35.

If a spray odor system was provided, locate the 5 gallon pail of GS-710 provided in the spray odor control cabinet. Remove the lid and install the pick up tube and level sensor. For field adjustments refer to pages 36 and 37.

Check for proper air flow at the kitchen hood. Make sure that all access panels have been installed in the duct work and all filters or cartridges are in place in the hood. Check for proper air volume per hood manufacturers instructions. Minimum flow should be the design volume. However, flows of up to 15% high are acceptable. The air flow will drop as the filters become dirty. Starting high will assure smoke capture even with filter loading.

Air volumes of 30 to 50% of design or a strong vibration may indicate that the fan is rotating backwards. Verify Fan rotation. If air flow still low or excessive vibration check fan for loose components, duct discharge may be blocked, or access panels open. Excessive vibration may be caused by shipping braces still in place.

Note: The green "ESP ON" light(s) may fluctuate/flicker when the unit is first started up. Normally a fluctuating green light is a temporary condition, lasting until the cells are dry, immediately following a wash cycle. This is caused by moisture left between the cell plates which will evaporate.

#### **WARNING:**

Running Fan Backwards will overheat the motor and can cause bearing failure or other serious damage and will Void Warranty.



# C-ESP Start-Up Inspection Report

This start-up Report Used For C-ESP Pollution Control Units  
One Report Must Be Completed For Each Control Cabinet

File Number \_\_\_\_\_

NAMEPLATE DATA: \_\_\_\_\_

Model No \_\_\_\_\_

Serial No \_\_\_\_\_

ESP/CEM \_\_\_\_\_

Job Name \_\_\_\_\_

Address \_\_\_\_\_

## PRELIMINARY CHECKLIST

UNIT EQUIPPED WITH EXHAUST FAN?  Yes  No  
 UNIT EQUIPPED WITH ODOR CONTROL?  Yes  No

### ALL UNITS:

1.  Open all removable access panels including electrical disconnect panel.
2.  Complete a thorough inspection of the unit for any shipping, handling or installation damages and, if any, note under comments.
3.  Verify that the debris screen and any other filters are in place and free of debris. See submittal drawing for details
4.  Verify all ESP cells are in place and properly connected..
5.  Verify that the hot water piping is connected to the HW inlet connection...
6.  Verify that the drain line is connected and that its size is equal to or larger than the drain outlet. Check that the drain is trapped.
7.  Verify that the spare fuses are provided inside the electrical disconnect panel.
8.  **IF UNIT EQUIPPED WITH EXHAUST FAN:**  
Verify that the wall insulation is secure and has not loosened in shipment.
9.  Verify that all shipping tie-downs, bolts and braces have been removed from exhaust fan spring isolators.
10.  Verify that the fan floats freely on the spring isolators and the fan wheel turns freely by rotating the pulleys.
11.  Verify that all bearing set collars are tight.
12.  Verify the exhaust discharge is not obstructed or directed toward any structure.
13.  Verify that the spare fan belts are provided inside the fan housing.

### IF UNIT IS EQUIPPED WITH MEDIA BED ODOR CONTROL:

14.  Verify all modules are in place and full of odor control media.
15.  Verify that all filters, debris screens and moisture separators are in place.
16.  Type of odor control media bed  carbon  potassium
17. Unit equipped with a fire protection system?  yes  No  
 If so, what type?  Sprinkler  Wet Chemical

## OPERATIONAL CHECKLIST

- ### ESP SECTION
1.  Close and latch all access doors & panels.
  2.  Verify that all circuit breakers are on and power is supplied to the C-ESP.
  3.  Place the door disconnect switch in the "On" position.
  4.  Push the "Start Fan" button on the control cabinet to energize the ESP cells and exhaust fan:
    - a. Exhaust Fan start?  Yes  No
    - b. Cell power pack lights on?  Yes  No

- ### FAN SECTION (if equipped)
1.  Verify that the exhaust fan rotates in the proper direction.

### WASH SEQUENCE

1. Push the "Start Wash" buutton located on the Control Cabinet and check the following:
  - a. Exhaust fan shut off?  Yes  No
  - b. Water turned on?  Yes  No
  - c. Detergent pump on?  Yes  No
  - d. Any C-ESP unit leaks?  Yes  No
  - e. Drains free and clear?  Yes  No
  - f. Cleaning cycle length \_\_\_\_\_ Minutes
  - g. Delay cycle length \_\_\_\_\_ Minutes
  - h. Water pressure \_\_\_\_\_ PSI
  - i. Water temperature \_\_\_\_\_
  - j. Brand of detergent used \_\_\_\_\_
  - k. Number of spare cells \_\_\_\_\_
  - l. Number of soak tanks \_\_\_\_\_
  - m. Location of spare ESP cell(s) and soak tank(s): \_\_\_\_\_

### FIRE TEST

1. With the ventilator on, open electrical compartment on Control Cabinet and push the "Fire Test" button.
  - a. Exhaust fan shut off?  Yes  No
  - b. All nozzles in ESP spraying?  Yes  No
 Personnel provided with technical manual?  Yes  No

- ### SPRAY ODOR (If equipped with)
1.  Locate container of GS-710
  2.  Place GS-710 container in the spray odor cabinet
  3.  Remove cap and install pickup tube and level switch in container
  4.  Verify that both timers are set to 15 seconds
- This may need to be adjusted to maximize the spray odor effectiveness decreasing the delay or increasing the spraying time will improve the effectiveness of the spray odor. Increasing the delay or decreasing the spray time will reduce the effectiveness of the spray odor system.

Date of Inspection: \_\_\_\_\_

Inspection Witnessed By: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Signature: \_\_\_\_\_

Inspection Performed By: \_\_\_\_\_

Name: \_\_\_\_\_

Company: \_\_\_\_\_

Comments \_\_\_\_\_

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Distribution: Captive-Aire Systems, Inc. / Customer / Sales Rep

## **THE CAPTIVE-AIRE C-ESP POLLUTION CONTROL UNIT**

### **LIMITED WARRANTY**

The Captive-Aire C-ESP Pollution Control Unit is warranted by CAPTIVE-AIRE SYSTEMS, INC., to be free from defects of material and workmanship under normal use when installed, operated and serviced in accordance with factory recommendations.

CAPTIVE-AIRE SYSTEMS, INC.'s obligation under this warranty shall be limited to repairing or replacing at its option any part of said equipment which CAPTIVE-AIRE SYSTEMS, INC.'s examination shall disclose to its satisfaction to be thus defective, for a period of one (1) year from the date of installation provided proper and acceptable evidence of such installation is recorded at the factory, or 18 months from date of shipment whichever occurs first.

**CAPTIVE-AIRE SYSTEMS, INC. SHALL NOT BE RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM A BREACH OF THIS WARRANTY.**

All replacement parts furnished under this warranty shall be F.O.B. Captive-Aire Systems, Inc., Youngsville, North Carolina. The owner shall pay the necessary freight delivery charges, and necessary labor for removal and installation of parts, and any federal, state or local taxes.

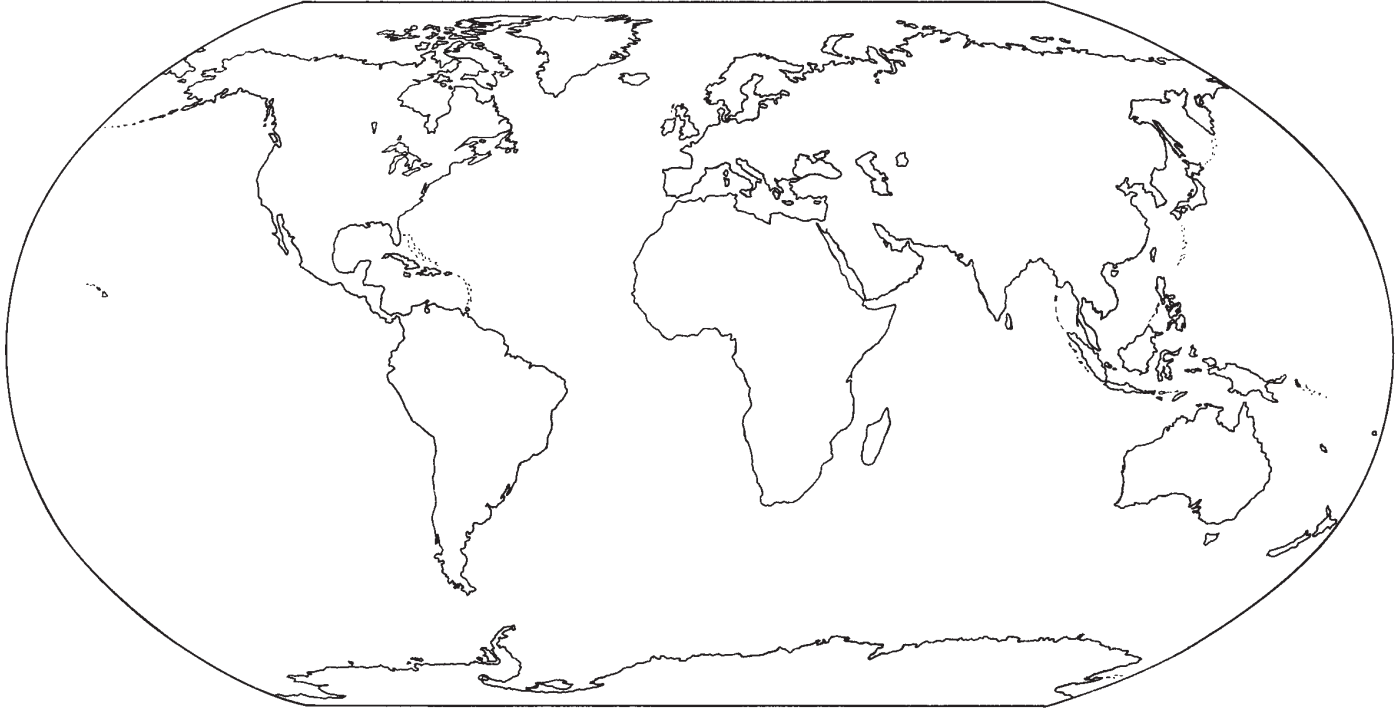
#### **SPECIFIC ITEMS NOT COVERED BY THIS WARRANTY:**

1. Fan belts if equipped with an exhaust fan.
2. Any filters, and/or KOR48/carbon media if equipped with media bed odor control.
3. Routine maintenance and cleaning as spelled out in The Captive-Aire C-ESP Model C-ESP Series Unit Technical Manual.
4. Malfunction or improper operation caused by fluctuating electrical or power surges or improper installation.

This is the sole warranty with respect to the aforesaid items. NEITHER CAPTIVE-AIRE SYSTEMS, INC. OR ANY OTHER PARTY MAKES ANY OTHER WARRANTY OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEED THE AFORESAID OBLIGATIONS ARE HEREBY DISCLAIMED AND EXCLUDED FROM THIS AGREEMENT.

# **CAPTIVE-AIRE**

THE PERFORMANCE COMPANY



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