



**BIOCLIMATIC**

**PLENUM AIR PURIFICATION SYSTEM**

**PAP SERIES**

**INSTALLATION, OPERATION**

**&**

**MAINTENANCE**

**MANUAL**

Bioclimatic Air Systems  
600 Delran Parkway  
Delran, NJ 08075 USA  
Tel.+1 (856) 764 4300  
Fax+1 (856) 764 4301

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# 1 INTRODUCTION

## 1.1 Disclaimer

These instructions are submitted with the implicit understanding that:

- 1.1.1 This manual is to guide the user of Bioclimatic Air Systems equipment in the proper installation, operation and maintenance procedures to insure maximum equipment life with efficient operation.
- 1.1.2 The customer has assigned competent maintenance and operating personnel to the system described herein and will assume operational and maintenance responsibility upon start-up of the system.
- 1.1.3 The customer will read and thoroughly examine the foregoing instructions and will notify the seller of any points not fully understood, points of conflict or error.
- 1.1.4 The customer, in lieu of any notification to the contrary, has read and fully understands the operation of the System and is aware of the hazards of corrosion, abrasion and fire or explosion and shall take the necessary steps in the operation of equipment to control such hazards to the maximum extent possible.
- 1.1.5 Start-up assistance or field engineering service provided by Bioclimatic Air Systems shall in no way relieve the customer of responsibility for the proper operation of the System.

## 1.2 Receiving

Products leaving the Factory are inspected and in satisfactory operating condition. All equipment should be thoroughly inspected when received. Although all units are firmly secured in their packaging, rough handling in transit can cause breakage. Any shortage or damage should be reported at once to the transportation company. Note the damage on the bill of lading before signing for the shipment. **No equipment may be returned to Bioclimatic Air Systems without written authorization. Returned equipment sent without authorization will be refused and returned to sender.**

All products are shipped F.O.B. Bioclimatic Air Systems warehouse. Responsibility for all equipment passes to the Buyer at the time equipment is loaded onto the carrier's truck.

## 1.3 Handling

Handle equipment with care when moving to prevent damage to special paints and surface coating. A small chip in the paint or coating will break the continuity of the surface

treatment and destroy its protective value. Always touch-up scratched surfaces prior to installation and start-up.

#### 1.4 Storage

When storing equipment, care must be taken to protect electrical connections, leads and finished surfaces from moisture, and contamination. Do not store the unit outdoors. Do not store any other material on top of equipment. Periodic inspections of the equipment should be made until it is ready to be put into service. Remove all filters from equipment when storing.

**NOTE: If equipment is not installed upon delivery, it must be stored in a weather-protected area.**

#### 1.5 Warranty

THE SELLER WARRANTS THE EQUIPMENT AGAINST DEFECTIVE WORKMANSHIP AND MATERIAL FOR ONE (1) YEAR FROM DATE OF FACTORY SHIPMENT OR 15 MONTHS FROM COMMISSIONING, WHICHEVER OCCURS FIRST. IN THE FULFILLMENT OF ITS WARRANTY, THE SOLE OBLIGATION OF SELLER SHALL BE TO REPAIR OR REPLACE, AT ITS OPTION, F.O.B. ITS FACTORY, ANY PART OR PARTS WHICH ARE RETURNED F.O.B. ITS FACTORY, SHIPPING CHARGES PREPAID, AND WHICH AFTER INSPECTION BY SELLER ARE FOUND TO BE DEFECTIVE. BUYER SHALL NOTIFY SELLER OF DEFECT IN WRITING, PROMPTLY UPON DISCOVERY AND WITHIN THE WARRANTY PERIOD. THIS WARRANTY DOES NOT COVER DEFECTS CAUSED BY CORROSION OR NORMAL DETERIORATION; IT DOES NOT EXTEND TO CONSEQUENTIAL DAMAGE, LOSS OR DELAY ASSOCIATED WITH A WARRANTY DEFECT; AND IT DOES NOT COVER ANY COST OF LABOR, TRAVEL, OR OTHER EXPENSE ASSOCIATED WITH THE REPAIR OR REPLACEMENT OF DEFECTIVE PARTS. SELLER ASSUMES NO LIABILITY FOR PRODUCT LOSS OR OTHER CLAIMS WHATSOEVER ARISING OUT OF THE USE OR APPLICATION OF THE EQUIPMENT IN ANY OPERATIONS, WHETHER THE MACHINE IS USED ALONE OR IN JOINT USE WITH OTHER EQUIPMENT OR PROCESSES. NOTWITHSTANDING THE FOREGOING, SELLER'S WARRANTY OBLIGATIONS WITH RESPECT TO ANY ITEMS NOT MANUFACTURED BY SELLER SHALL NOT EXCEED THE OBLIGATIONS UNDERTAKEN BY THE MANUFACTURER THEREOF UNDER EXPRESS WARRANTY TO THE SELLER. THIS EXPRESS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES OF FITNESS OF THE MACHINE FOR ANY PARTICULAR PURPOSE.

THERE ARE NO OTHER REPRESENTATIONS, WARRANTY OF CONDITION IN ANY RESPECTS EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE IN CONTRACT OR TORT, OTHER THAN WHAT IS STATED ABOVE.

THE SELLER SHALL NOT BE HELD LIABLE IN ANY WAY FOR CONSEQUENTIAL DAMAGES, HOWEVER CAUSED.

THIS WARRANTY WILL NOT APPLY IF THE SELLER'S EQUIPMENT HAS BEEN DAMAGED DUE TO IMPROPER INSTALLATION, ALTERATION, ABUSE OR MISUSE, ACCIDENT, FIRE, FLOOD OR ACT OF GOD. FURTHER, THIS WARRANTY WILL NOT

APPLY IF REPAIRS, REPLACEMENTS, OR ALTERATIONS ARE MADE BY OTHERS WITHOUT THE SELLER'S PRIOR WRITTEN AUTHORIZATION.

IN THE EVENT THE STATE IN WHICH THE EQUIPMENT IS INSTALLED DOES NOT PERMIT THE LIMITATION OR EXCLUSION OF IMPLIED WARRANTIES OR CONDITIONS UNDER GIVEN CIRCUMSTANCES, THE PROVISIONS OF THIS WRITTEN WARRANTY ARE IN ADDITION TO AND NOT A MODIFICATION OF THE STATUTORY WARRANTIES AND OTHER RIGHTS AND REMEDIES PROVIDED BY SUCH LAWS.

**NOTE:**

“ANY MODIFICATION TO ORIGINAL EQUIPMENT BY ANY COMPANY OR PERSON OTHER THAN THE MANUFACTURER WILL SERVE TO CANCEL AND VOID ALL OF THE SELLER'S LIABILITY UNDER THE MANUFACTURER'S WARRANTY. ENCLOSURES CONTAINING ELECTRONIC COMPONENTS ARE NORMALLY SEALED BY THE MANUFACTURER TO PREVENT UNAUTHORIZED TAMPERING OR ADJUSTMENTS. ONLY AUTHORIZED SERVICE PROVIDES MAY BREAK SEALS TO COMPLETE CALIBRATION OR TO TROUBLE SHOOT THE UNIT. UNAUTHORIZED TAMPERING OR BREAKING SEALS WILL RELEASE THE SELLER FROM ANY FUTURE LIABILITY UNDER THE WARRANTY”

2 **INSTALLATION**

2.1 **Initial Setup**

Mount the Plenum Air Purification (PAP) Unit on top of the existing framework of the Liebert Air Conditioning Unit. It is designed to fit securely within the perimeter of the support flange on the top of the air conditioning unit. While no additional fasteners are required to support the PAP, it is recommended that the framework of the PAP be bolted at each of the four corners to the framework of the air conditioning unit. This is necessary to protect the integrity of a common equipment ground between the air conditioning unit and the PAP.

2.2 **Electrical Connections**

An electrical wiring diagram is included with these instructions.

**NOTE: Prior to installing any wiring, check the unit name plate for main power voltage, control voltage, transformer sizing and any fuse sizing. All field wiring must comply with National Electric Code and local code requirements.**

The PAP unit contains all necessary electrical components necessary to operate the Bi-polar ionization unit. The system is factory wired and tested to operate from a supply voltage source of 115 volts AC, 60 Hz (3-pole, 3-wire).

Refer to the wiring diagram for proper wiring connections. Mount and wire any field installed items as indicated on the factory supplied wiring diagram. When mounting field installed components, do not jumper out or rewire any factory wiring without written authorization from MeadWestvaco Air Systems. (Violation will void warranty.) Pay particular attention to proper grounding of the unit.

**NOTE: Unit installation and interconnect wiring between the PAP and the Liebert air conditioning unit is to be performed only by or under supervision of a licensed electrician or other qualified personnel. Installation must be in accordance with approved electrical standards and in compliance with applicable portions of NEC Code, Article 300.22 and other applicable electrical codes.**

**NOTE: Do not make the electrical connections to the PAP, either from the power distribution block inside the Liebert air conditioning unit or other outside electrical service without first confirming circuit integrity and compatibility. Bioclimatic Air Systems is not responsible for interface electrical wiring or connections to the PAP. If primary service to the PAP is derived from 3-phase Y 120/208V, make absolutely certain to extend the white wire (SYS.GND) from the service distribution point to the PAP and ground it securely in the PAP next to the fuse block.**

- 2.2.1 Locate the power disconnect switch on the left side of the control panel. Make sure this switch is turned "off".
- 2.2.2 Locate the power switch on the right side of the control panel. Depress this push button switch to release in "off" position.
- 2.2.3 Using the red-handled hex wrench, unlock the two Dzus fasteners on either side of the exterior control panel and remove the panel. The panel is attached to the power distribution box with a special twist-lock, 9-pin Amp connector. Unlock this connector and free the front panel to provide access to all electrical circuit boxes.
- 2.2.4 Unscrew the four hold-down screws on the top cover of the power distribution box and remove the cover.
- 2.2.5 Connections of the 208-volt power may now be made directly to the top screw terminals on the fuse block marked F1 and F2. A ground terminal should be installed adjacent to the fuse block and will be considered "equipment ground". It must be used to terminate the ground connection associated with the 3 phase line service as explained in "note" above. After proper connections are made, attach the top cover on the power distribution box and install the control panel while being careful to engage the keyed shaft on the switch handle into the mating shaft protruding from the switch box.

## 2.3 Ionization Tube Installation

Install ionization tubes as follows:

- 2.3.1 Screw tubes into socket by holding the leaf spring clear of tube surface.
- 2.3.2 Turn tube into socket by the polycarbonate base.
- 2.3.3 After tube contacts base, tighten an additional 1/8 to 1/4 turn. Do not use hand tools to tighten tubes, as they will damage the glass tubes.
- 2.3.4 Ensure leaf spring is in contact with outer mesh.

**NOTE: The ionization tubes are fragile - Handle With Care.**

## 2.4 Filter Installation

When installing filters, refer to the filter label located on the inside of the access panels. This label itemizes all filters in the unit and their arrangement.

**NOTE: Make sure that airflow arrow on the filter points in the direction of airflow through the unit.**

The PAP unit is delivered with the first set of particulate filters already installed.

## 2.5 Setting the Static Pressure Switch

The filter change light indicates the need to replace the fibrous filters. The differential pressure switch which activates the filter change light must be field calibrated at the time of unit installation.

The calibration procedure is as follows:

- 2.5.1 Locate the static pressure adjustment screw as seen on the included drawings.
- 2.5.2 With clean filters, turn the unit on cover approximately 67% of the intake area with cardboard.
- 2.5.3 With a standard screwdriver, turn the adjustment screw counterclockwise until the light comes on, or clockwise until the light goes off.
- 2.5.4 For more time between filter changes (less air flow), cover more of the opening and for less time between changes (more air flow), cover less of the opening.

# 3 PHYSICAL DESCRIPTION

## 3.1 Filter Arrangement

The Plenum Air Purification System is designed for filtration of environmental air so as to control particulate and gaseous contaminants in applications where high speed laser printers are used or to protect delicate electronic equipment. There are two possible filter arrangements for this unit:

### 3.1.1 Fibrous Filter Arrangement

Prefilters are of the disposable panel type with a rated average efficiency of 20% by the ASHRAE Standard 52.2 test method. The primary filter has a rated average efficiency of 60% by the ASHRAE Standard 52.2 test method, using atmospheric dust. Filters are listed Class 2 by Underwriters' Laboratories.

### 3.1.2 Polarized Media Filter Arrangement

This arrangement consists of a single filter with a screened enclosure and a disposable media pad. The filter is connected to the power of the unit, which enables it to generate an electrical field. This field polarizes the particles passing through the filter as well as the filter media itself. The polarized particles are then attracted to and collected on the filter media.

## 3.2 Bi-Polar Ionization

The Bi-polar ionization unit consists of a power generator, ionization tubes and power regulator.

The power generator produces line synchronized bi-polar ionization of an airstream whose flow is perpendicular to the axis of the tubes. Thus, depending upon the volume of air, its velocity, chemical and biological content, ionization is adjusted by means of local control to affect particle discharge density sufficient to produce the desired volumetric air purification. Each generator is equipped with an independent voltage regulator to control ionization voltage to the tubes. Externally, the power generator includes ionization tube sockets, spring contacts, fuse, fuseholder and indicator lamps.

The ionization tube consists of two electrodes, a glass tube and a polycarbonate base with a male threaded connector. The external electrode is crimped around the glass tube by the manufacturer, and under no circumstances should it be removed from the tube. The glass tubing material is fragile and should be handled with care. Cracked or damaged glass will cause a system malfunction and require tube replacement.

The power regulator provides control of the output of the ionization tubes. The output can be set to low or high depending on the position of the "hi/low" push-button switch on the control panel.

**NOTE: Ozone is a by-product of any ionization process. When installed and operated in accordance with manufacturer instructions, the Bioclimatic Air Systems System will not generate ozone in excess of the safety standards specified by OSHA and FDA. In most cases, there will not be chemically detectable levels of ozone generated.**

## 4 SYSTEM START-UP

### 4.1 General

Before starting the System, a complete inspection should be made to ensure that all the equipment is installed for safe and proper operation. It is particularly important that the system is free of all foreign objects. Be sure all access panels are securely closed.

### 4.2 Inspection Check List

Unit securely mounted	_____
Unit properly wired	_____
Filters installed properly	_____
Surface continuity between filters and seal surfaces	_____
Wipe entire section clean	_____
Properly rated fuse present in generator's fuse holder	_____
Inspect individual ionization tubes for damage	_____
All ionization tubes properly installed	_____
Unit securely closed	_____

### 4.3 Power Up

Once all of the particulate filters and ionization tubes are properly installed, and the inspection of the system has been completed, replace the access panels that were removed during filter installation. Power up the Liebert air conditioning unit, then turn the power disconnect switch on the Plenum Air Purification unit to the “on” position.

**NOTE: The Liebert system must be powered up in order for the Plenum Air Purification Unit to be operational.**

Once the power disconnect switch is turned to the “on” position, the Bi-Polar ionization system can be powered up by depressing the ionization power switch. When the system is powered up, the ionization indicator light will illuminate.

The level of ionization can be regulated by pushing the hi/low switch located next to the ionization power switch.

## 5 OPERATION & MAINTENANCE OF UNIT

### 5.1 Filter Maintenance

#### 5.1.1 Fibrous Filters

The fibrous filters require periodic maintenance in order to ensure satisfactory system performance over an extended period. The filter change light indicates when the fibrous filters should be replaced. When the filter change light illuminates, the prefilter **ONLY** should be changed according to the procedure indicated below. If the filter change light is not lit when the unit is started, the primary filter **NEED NOT BE CHANGED**. If the filter change light remains lit after starting the unit, replace the primary filters. After replacing both sets of filters, the filter change light should go out when the unit is operating.

It is important to use high quality filters meeting the same specifications as those provided with the unit. The filter label affixed on the inside of the rear access panel lists the part number of the filters supplied with the unit. Do not install damaged filters or those that appear to be defective.

Filters should be replaced as follows:

- 5.1.1.1 Turn power disconnect switch to OFF position.
- 5.1.1.2 Remove the rear access panel and inspect gasketing. (Replace damaged or worn gasketing.)
- 5.1.1.3 Remove the used filters.
- 5.1.1.4 Vacuum, or wipe clean the holding frames.
- 5.1.1.5 Remove the new filters from their carton and install them in the unit. Make sure that the airflow arrow on the filter points in the direction of airflow through the unit.
- 5.1.1.6 Replace the rear access panel.
- 5.1.1.7 Turn power disconnect switch to ON position.

## 5.1.2 Ionization Tubes

The ionization tubes must be cleaned on a periodic basis to ensure operating efficiency. At minimum, they should be cleaned any time that the primary filter is serviced but in no case longer than one year. The tubes can be cleaned using the following procedure:

**IMPORTANT: Make sure all power to the unit is disconnected before performing this or any maintenance procedure.**

- 5.1.2.1 Remove the tubes from the unit by lifting the leaf spring from the surface of the tube and unscrew each tube. Hold tube by its plastic base while removing.
- 5.1.2.2 Clean tubes with a solution of warm water and non-abrasive detergent. A soft nylon brush may be used to remove embedded material within the external electrode.

**NOTE: Do not attempt to remove the tube's outer electrode.**

- 5.1.2.3 Rinse with clean water after washing.
- 5.1.2.4 Replace ionization tubes only after they are completely dry. Pay special attention to removing moisture from the polycarbonate base.
- 5.1.2.5 Screw tube into socket by holding the leaf spring clear of tube surface. Turn tube into socket by the plastic base. After tube contacts base, tighten an additional 1/8 to 1/4 turn.

**NOTE: Do not use hand tools to tighten tubes, as they will damage the glass tubes.**

- 5.1.2.6 Make sure that the leaf spring is in contact with tube surface.

**REMEMBER: The tubes are fragile - Handle With Care.**

## 5.2 Fuse replacement

If the fuse blows on the front of the PAP unit, it is indicative of a defective tube or generator problem. The problem can be accurately identified as follows.

- 5.2.1 Remove all tubes, replace fuse and test. If the fuse blows, the generator is probably defective. If the fuse does not blow, inspect tubes for signs of cracked glass or arcing.

**NOTE: Do not use damaged tubes.**

- 5.2.2 Insert one (1) tube at a time and test. Continue independently testing each tube until the defective tube is identified. A Tube Test Unit (TTU) may also be used to quickly and efficiently identify defective ionization tubes. Tube Test Units are available from MeadWestvaco Air Systems.
- 5.2.3 If the generator is found to be defective, contact MeadWestvaco Air Systems for further instructions. Please Note: **No equipment may be returned to Bioclimatic Air Systems without written authorization.**

## 5.3 Gasket Replacement

After a period of operation, the gasketing on the unit may need to be replaced. It is important to replace it only with **closed cell neoprene gasketing**. Do not use rubber gasketing, as it is not suitable for use with this equipment.