



**BIOCLIMATIC**

**INTERNALLY REGULATED (IR) & UNREGULATED UNITS**

**AEROTRON **IG-40** SERIES 2500 TO 4000 CFM**

**INSTALLATION, OPERATION**

**&**

**MAINTENANCE**

**MANUAL**

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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 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 shall in no way relieve the customer of responsibility for the proper operation of the System.

**IMPORTANT: Any modifications to the unit by unauthorized personnel will void ETL listing and factory warranty. The unit must be installed in accordance with the manufacturer's instructions to preserve warranty and ETL label.**

### 1.2 Receiving

Products leaving the Bioclimatic factory are inspected and in satisfactory operating condition. All equipment should be thoroughly inspected when received. Although all units are properly packaged, 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 without written authorization. Returned equipment sent without authorization will be refused and returned to sender.**

All products are shipped F.O.B. (ExWorks, FCA) Bioclimatic warehouse. Responsibility for all equipment passes to the Buyer at the time equipment is loaded onto the carrier's truck.

1.3 Storage

If the Aerotron unit(s) is not installed upon delivery, it should be stored in a cool, dry, weather protected location. Do not stack any other equipment on top of the unit.

1.4 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 CONJOINT 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 EITHER 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 PHYSICAL DESCRIPTION AND THEORY OF OPERATION

### 2.1 Principle of Operation

Aerotron IG-40 ionization generator is designed specifically for duct or plenum mounting. Generators are normally installed in the return air side of an air handling unit following the final filter or alternatively in the supply plenum or duct work. Maximum air velocity for efficient system operation is 1000 fpm. Optimum air velocity across ionization tubes is 400 to 600 fpm. Internally regulated ionization generators are generators containing their own internal voltage regulation components.

Generators containing no internal voltage regulation are frequently referred to as “unregulated” units.

There are two types of IG-40 generators (Figure 1):

- Regulated
- Unregulated.

Regulated generators:

- The variable two level control circuit is contained within the generator housing.
- All calibrations are performed (only by Bioclimatic Air Systems) on the generator circuit board.
- The output voltage is varied by the “Hi / Lo” switch. Hi – 2350 VAC, Low – 2100 VAC.

This type of the IG-40 was designed for small applications requiring minimal generator quantities.

Unregulated generators:

- The UR Aerotron IG-40 is controlled by a remote monitor.
- The output voltage to the generator is variable (1250-2500 VAC), and all calibrations are performed at the remote monitor.

These generators were designed for medium or large applications requiring multiple generators in diverse configurations and centralized output controls.

### 2.2 Aerotron IG-40 Bi-Polar Ionization Unit

The Bi-polar ionization unit consists of a power generator and ionization tubes. (Fig 2) The power generator produces line synchronized bi-polar ionization of an air stream 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. Convenient test jacks provide access to a low voltage source, proportional to the ionization tube potential. Externally, the power generator includes ionization tube sockets, spring contacts, fuse, and fuse holder and indicator lamps.

The ionization tube consists of two electrodes, a glass tube and a plastic 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.

**NOTE: Ozone is a by-product of any ionization process. When installed and operated in accordance with manufacturer instructions, the Bioclimatic System will not generate ozone in excess of the safety standards specified by OSHA and FDA. Under normal operating conditions, there will not be measurable levels of ozone.**

### 2.3 System Regulation and Test Jacks

Aerotron Regulated (IR) IG-40 ionization generators produce the amount of positive and negative ions in the external field surrounding ionization tubes. Ionization density is generally measured in terms of ions per cubic centimeter of air (ions/CM<sup>3</sup>).

The volume of ions produced is roughly proportional to the high voltage applied to the ionization tubes. The “Hi/Lo” switch regulates this high voltage potential and therefore provides a simple and effective means of controlling ion emission in the system.

Factory settings for both high and low voltage limits are 2300 VAC and 2100 VAC, respectively.

In order to insure a safe and convenient way of measuring high voltage within these limits, two external test jacks are provided on the side of the enclosure. These jacks allow access to a comparatively low voltage (less than 3 volts) which is proportionally to the high voltage present across the tubes.

The test jacks, therefore, offer a means of checking the output of the Aerotron generator without the risk of exposure to dangerous high voltage.

For Regulated IG-40 generators the test jack voltage compared to the actual ionization potential shown in Table 1.

TABLE 1

<u>Status</u>	<u>High Voltage RMS</u>	<u>Test Jack Voltage</u>
Low	2100	2.37 ± 0.05
High	2350	2.68 ± 0.05

Figure 5 (Range & Status Calibration) also shows the relationship between ionization voltage and corresponding test jack voltage and the status of the three range indicator status lamps. (For IG-40 generators are controlled by a remote monitor.)

### 3 INSTALLATION (Figure 3 & 4)

#### 3.1 Initial Setup

##### Aerotron IG-40 Bi-Polar Ionization Units

Aerotron IG-40 is designed for installation in the duct or plenum on the air return side of the air handling unit following the final filter. Minimum clearances between final filter and ionization tubes and heating or cooling surfaces shall be four inches (101 mm). Where space permits, increase clearances on the downstream side of the ionization tubes to 12 inches (305 mm).

Alternately, Aerotron IG-40 may be installed in the air handling unit supply plenum or ductwork subject to ambient temperature and air velocity limitations. Allow a minimum of 8 inches (203 mm) clearance between ionization tubes and heating surfaces and 12 inches (305 mm) clearance between ionization tubes and cooling surfaces.

The maximum air velocity for efficient system operation is 2,000 fpm. The optimum air velocity across ionization tubes is 400 to 600 fpm. The maximum ambient temperature for the ionization tubes is 135°F in vertical installation and 125°F in horizontal installations.

#### 3.2 Installation

Install the Bioclimatic unit in accordance with the following guidelines.

3.2.1 After selecting the best location for the Aerotron system, arrange the unit(s) across the plenum's width in accordance with Aerotron Equipment Arrangement Instructions, Bulletin 163, found in our Engineering Catalog, Tab 3.

Be certain there is sufficient duct/plenum height to accommodate the ionization tubes.

Allow approximately three inches (76 mm) clearance between the ends of the tubes and duct. A minimum of four inches (101 mm) clearance should also be provided between the side of the tubes and the duct. The best installation will provide maximum strength to the tubes and minimize the risk of stress cracks in the glass.

3.2.2 Install ionization tubes as follows:

3.2.2.1 Screw tubes into socket by holding the leaf spring clear of tube surface.

3.2.2.2 Turn tube into socket by the plastic base.

- 3.2.2.3 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.
- 3.2.2.4 Ensure leaf spring is in contact with outer mesh.
- 3.2.2.5 Close access door.

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

- 3.2.3 Insert assembled unit into duct (AHU). Snap nuts with threaded inserts may be installed into predrilled holes and machine screws used to secure the generator into position. The use of snap nuts with machine screws will insure a tight fit to the duct even after several removals for routine maintenance.
- 3.2.4 Wire Aeration IG-40 into a 120 volt, 1 phase, 60 Hz (230 volt, 1 phase, 50 Hz) power source in accordance with the enclosed wiring diagram and local electrical codes. Note that the Bioclimatic system must be wired into a static pressure switch or the blower circuit such that power will be disconnected when there is no air movement or the ventilation blower is not operational

**ATTENTION:** During periods of low heating or cooling loads or during periods when the building is not occupied, it is recommended that the blower operate 20 minutes every hour. This procedure will help reduce levels of airborne contamination currently being introduced or that which accumulates while the building is not occupied.

**NOTE:** Airborne particulate will not be removed from the air with the Bioclimatic Aerotron IG-40. Proper filtration is required to remove airborne particulate. Bioclimatic systems are compatible with most types of mechanical filtration systems. At minimum, 30% ASHRAE filtration is required with the Bioclimatic Aerotron systems.

- 3.2.5 Periodically, ionization tubes should be washed to remove any surface dirt and restore operating efficiency. Assuming the use of proper filtration, this maintenance should be scheduled every six months. Remove ionization tubes by the reverse procedure in Paragraph 3.2.3 outlined above. Follow procedures in Paragraph 4.3 for washing of the ionization tubes. Observe the same procedures in replacing the ionization tubes to the Aerotron unit(s).

**CAUTION:** DO NOT attempt to connect the Aerotron IG-40 unit(s) across multi-phase 3 or 4 wire circuits or across any electrical service in which pole to pole voltage exceeds 240 Volts rms.

## 4 OPERATION

### 4.1 General

Figure 1 shows an outline drawing of the electrical connection and controls for regulated and unregulated IG-40 generators. To start generator(s) it is necessary to activate all power switches. Set the ionization level control using “Hi/Lo” switch or ionization gain control (for remote monitor). Ensure there is sufficient airflow in the system. To disconnect the System – turn to the “Off” position power switches.

The calibration procedure for the remote monitors is fully described in “Bioclimatic Remote Monitor Installation, Operation and Maintenance Manual”.

#### 4.2 Ionization Tubes

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

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

- 4.2.1 Remove the tubes from the unit by lifting the leaf spring from the surface of the tube and unscrew each tube.
- 4.2.2 A solution of warm water and non-abrasive detergent can be used to clean the tubes.
- 4.2.3 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.**

- 4.2.4 Rinse with clean water after washing.
- 4.2.5 Replace ionization tubes only after they are completely dry. Pay special attention to removing moisture from the polycarbonate base.
- 4.2.6 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.**

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

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

## 5 TROUBLESHOOTING GUIDE

Under normal operating conditions, all generators will respond uniformly to changes in position or setting of the power control located on the control box (regulated generators), and the remote control (unregulated generators).

Always refer to the custom wiring diagram for the specific job being serviced.

- 5.1 The Remote Monitor and IG-40 generators will not energize.

<b><u>Possible Cause:</u></b>	<b><u>Possible Solution:</u></b>
Facility circuit breaker is tripped or turned off.	Check the circuit breaker and reset it if necessary.
The airflow switch (safety interlock) is disengaged or malfunctioning.	Ensure the airflow switch is mounted vertically and there is sufficient airflow in the System.
A door switch is open or malfunctioning.	Ensure all door switches are securely mounted and closed when the doors are shut. Ensure all door are closed.
The Remote Monitor (RM) and control box power switches are turned to the “Off” position.	Ensure all power switches are activated.
The fuse on the RM faceplate or IG-40 generator is blown.	Check the fuse for continuity, proper rating and value. Replace if necessary.
There is a faulty wiring connection between the circuit breaker and the Remote Monitor or IG-40 generator.	Ensure all wiring connections between the circuit breaker and Remote Monitor (IG-40 generator) are secure and correct. Refer to custom wiring diagram.

5.2 The RM amp generators appear to be functioning properly, but there is arcing coming from one of the generators.

<b><u>Possible Cause:</u></b>	<b><u>Possible Solution:</u></b>
An ionization tube is damaged.	Identify which tube is damaged, de-energize the System and replace the ionization tube.
Conductive material is shorting between the generator and the support rack.	Identify the material, disconnect the System and replace the ionization tube.
Water/condensation has deposited conductive material between the tube socket and the generator rack.	Disconnect the System and inspect the suspected generator for signs of arcing around the tube socket.

**ATTENTION:** Corrective action must be performed by qualified personnel only. Refer to manufacturer's recommended replacement procedures for ionization tubes.

**WARNING:** DO NOT ATTEMPT TO REPLACE ANYTHING WHILE POWER TO THE SYSTEM IS ON. DISCONNECT ALL POWER BEFORE SERVICING ANY UNIT.

**NOTE:** FOR STABLE OPERATING CONDITION OF THE SYSTEM(S) WE RECOMMEND TO CONNECT EACH REGULATED GENERATOR (IF MORE THAN ONE) TO DEDICATED CIRCUIT (LINE, PHASE) OR USE ISOLATION TRANSFORMER(S).

## 6 SPECIFICATIONS

### 6.1 Electrical

Power Requirement

115/230 volts AC, 1 phase 50/60 Hz

