FIELD ASSEMBLED ELECTRONIC
AIR CLEANER

ELECTRONIC FILTER BANK

- INSTALLATION
- OPERATION
- SERVICE

Electrostatic Precipitators for Commercial Applications

CAUTION:
READ INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS CAREFULLY
FOR SAFE OPERATION

EXERCISE EXTREME CAUTION WHEN WORKING WITH ELECTRICITY

CAUTION:
DO NOT OPERATE UNIT WITHOUT AIR FLOW

TRION
www.trioninc.com

Manual Part Number 156853-001           04-2009
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OPERATION

This electronic air cleaner is technically known as a two-stage electrostatic precipitator. The air cleaner is designed to remove airborne particulates, including dust, dirt, smoke, pollen, virus, spores, bacteria, and mold from indoor air. Air movement through the unit is provided by the heating, air conditioning or ventilating system blower. As dirty air enters the air cleaner, the air passes through metal mesh pre-filters. The pre-filters prevent lint, hair and other large particulates from entering the air cleaner. It is important that these filters be in place to prevent excessive dirt loading of the air cleaner electronic cells. These filters extend the time interval between scheduled maintenance of the air cleaner, which allow the electronic cells to provide clean air for a longer period between washings. The pre-filtered air then passes through a two-stage electronic air cleaner. In the first stage, all airborne particulate, even submicron size, are electronically charged (positive) as they pass through the ionizer section. The ionizer field is a result of a corona discharge emanating from the fine, tightly strung wires suspended between two adjacent flat plates. In the second stage, the charged particulate passes through an intense electrical field established between alternately charged and grounded parallel collector plates. Here, the charged (positive) particulate is attracted to the ground (negative) plates and removed from the air stream.

The EFB provides a relay contact for connections to a building management system to provide remote status indication.

For most efficient air cleaning, airflow must be spread evenly over the face of the air cleaner. If the duct is a different size than the air cleaner array, gradual transitions are recommended.

CAUTION!

Do Not Operate Unit Without Air Flow

When there is a danger of rain, snow or debris being drawn into the system with outside air, the make-up air intake should be protected with rain louvers, hooding and hardware cloth to prevent the rain, snow or debris from entering the electronic air cleaner.

WARNING!

SAFETY NOTE:

Factory designed access to all electrically charged high voltage components contain electrical interlocks for the safety of operating personnel. Any additional access that may be provided in the system, where there is access to high voltage, must be equipped with such interlocks.

For ease in maintenance and component removal, adequate space, minimum services access of 24" (610 mm), must be provided in front of all access to the cell assemblies.

OUTDOOR INSTALLATIONS

The EFB is NOT designed to be installed in outdoor applications unless the system is housed inside a weatherproof structure such as an air-house or enclosed shelter.

Requirements for outdoor protection vary in accordance with climate and equipment com-
ponent arrangement for the particular job. The best approach for equipment protection is the construction of a heated shelter or building over the installation.

**INSTALLATION**

**FOR THE INSTALLING CONTRACTOR**

1. **UNPACK AND INSPECT**
   At the time the unit is received, all shipping containers and their contents should be examined for damage. Any damage occurring in shipment must be immediately reported to the carrier, an inspection report completed and a claim filed with the carrier at the receiving point.

2. **MOUNTING POSITION**

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**WARNING !**

Heavy Equipment Hazard
Can Cause Personal Injury or Equipment Damage
Mount the air cleaner with the power supply on top. Do not mount the air cleaner with the pre-filter facing down. The latches may not hold and the pre-filter and cell can fail unexpectedly.

Many commercial systems require installation of multiple electronic air cleaners. The EFB is capable of being mounted side to side and stacked in rows. The careful planning of the number of air cleaners required and the positions of each air cleaner will minimize the time required for installation. To envision the air cleaner array and the required installation plan, the EFB units may be temporarily stacked on the floor.

3. **ASSEMBLING THE EFB ARRAY**

The EFB units are designed with side flanges so a row of up to six units can easily be constructed. The units should be attached using eight # 8 x 3/8 in. (M5 x 9mm) sheet metal screws.

Before attaching the units together, plug the wiring connectors together. Multiple rows of the EFB can be stacked to build the proper sized array. Attach the upper rows using four # 8 x 3/8 in. (M5 x 9mm) sheet metal screws.

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4. **ASSEMBLING THE EFB SUPPORT STRUCTURE**

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**WARNING !**

Construction Collapse Hazard
Can Cause Personal Injury or Equipment Damage
Provide adequate structural support to prevent array collapse. Support each unit with external structural elements across both top and bottom and add cross supports as needed.

Provide adequate array support to prevent collapse: (See Page 8, Figure 1)
- As a minimum, provide external structural support across the top and bottom of each unit.
- Provide cross supports as needed.

5. **DETERMINING DESIGN REQUIREMENTS**

The air cleaner is adaptable to new or existing forced air heating, cooling and ventilating systems. Transitions, turning vanes, or offsets may be needed in some applications.

Use transitions when duct opening is a different size than the cleaner array. Small gradual transitions will reduce turbulence within the air and improve the efficiency of the EFB. (See Page 8, Figure 2) Limit the duct change to no more than 20 degrees or four inches per linear foot (one meter per three linear meters).

6. **INSTALLING THE EFB**

**WHEN INSTALLING THIS PRODUCT:**

- Read these instructions carefully. Failure to follow the instructions may result in damage to the product or may cause a hazardous condition.
- Check the ratings given in the instructions and on the product to ensure the product is suitable for the required application.
- The unit must be installed by a trained, experienced service technician.
- After installation is complete, check out the operation as described in this manual.
WARNING!
Electric Shock Hazard
Can Cause Electrical or Equipment Damage
Do not connect power before the installation is complete.

7. UNPACKING THE EFB

The EFB is shipped assembled. Please check to ensure all components are included:

- Galvanized steel cabinet with integral power supply
- Two electronic cells per cabinet
- Parts package with screws
- One pre-filter lint screen per cabinet

8. FASTENING THE EFB CABINET TO AIR HANDLER DUCT FLANGE

- Remove and set aside the pre-filter and electronic cells.
- Assemble the array of the air cleaner units in the required size according to the “Assembling the Array” section.
- Install a transition to the air handler duct if the opening is different from the opening of the air cleaner array. (See Page 8, Figure 2)
- Move the completed array into place against the air handler duct flange.
- Attach the air cleaner cabinets securely using #8 (M6) sheet metal screws or rivets.

9. REASSEMBLING THE EFB

- Insert the electronic cell with the contact board up and the air flow arrow pointing down.
- Tilt the cell toward you and insert the bottom of the cell first.
- Pull the base of the cell forward against the cell stop (See Page 9, Figure 3) and rotate the top of the cell back into position under the spring contacts.
- If the cell does not seat properly, check the orientation of the air flow arrow on the cell.
- Assemble the pre-filter to the front of the unit by first inserting the lower portion of the pre-filter into the slot at the bottom of the cabinet.
- Place the pre-filter back into position.
- Rotate the latch to secure the pre-filter in place.

WIRING

WARNING!
Electric Shock Hazard
Can Cause Personal Injury

Be sure line voltage power source is the same as the voltage and frequency listed on the EFB label

- Ensure all wiring complies with local codes and ordinances.
- Wire the EFB directly to the correct voltage and frequency source. (See Page 10, Figure 4)
- Install electrical junction box with cover for all external plug connectors and wiring connections.

1. POWER CONNECTIONS

- Decide which end of the installed array is most accessible for wiring.
- Cut off the plastic connector for each row of air cleaners on the end selected.
- Install a 2" x 4" (50.8 mm x 101.6mm) electrical junction box to the end of each row of air cleaners.
- Connect the power and ground leads to each row of air cleaners.
- Install cover on each box.
- Install box and cover over power connector on opposite end of each row.

2. CONNECTIONS TO THE BUILDING MANAGEMENT SYSTEM

- Decide which end of the installed array is most accessible for wiring.
- Cut off the plastic connector for each row of air cleaners on the end selected.
- Install a 2" x 4" (50.8 mm x 101.6mm) electrical junction box to the end of each row of air cleaners.
- Connect each row in parallel to the building management system.
- Install cover on each box.
3. CHECKOUT

INSPECTING INSTALLATION

Make sure:
- Sheet metal joints between the EFB and duct are sealed.
- All sheet metal connections are complete.
- Outside air, if used, is mixed with return air or heated, as necessary, before it can reach the EFB.
- Electronic cell and pre-filter are clean and dry.
- Electronic cell installed with air flow pointed downstream.
- All electrical connections completed in compliance with local codes.

CHECKING AIR CLEANER OPERATION

With all components in place, turn on the EFB switch and energize the power supply. Check if the ON indicator light is lit. WASH and FAULT lights are lit for 30 seconds, after 30 seconds, WASH and FAULT lights go out. FAULT light comes on if there is a problem with the high voltage supply.

If operation is not as described, refer to the Troubleshooting section.

--- CAUTION! ---

Do Not Operate Unit Without Air Flow

MAINTENANCE

WARNING!

Sharp Edges
Can Cause Personal Injury

Wear protective gloves to prevent cuts from sharp edges.

1. CLEANING CELLS AND PRE-FILTERS

Regular washing of the cells is necessary to ensure proper performance. A thorough washing, once every two months will be adequate for most installations. More frequent (once a month) washing may be necessary with some installations. WASH indicator lights indicate it is time to wash the pre-filters and cells.

---

To Wash Cells and Pre-filters:

We suggest you follow the instructions below to properly and thoroughly clean your cells.

⇒ Place enough hot water in a utility tub to cover the first cell. Dissolve 2-4 oz. (60-120 ml) of granulated automatic dishwasher detergent (NOT laundry detergent) in the water.
⇒ Allow the cell to soak for 30 minutes. Agitate it up and down in the solution until it appears clean, then remove.
⇒ Repeat with second cell (if applicable)
⇒ Agitate the pre-filters up and down in the solution until they appear clean.
⇒ With a hose, rinse the cells and pre-filters. The hose should be held about 10° (250 mm) from the cell plates and at a slight angle for better cleaning results. Be careful not to spray the ionizing wires directly with the hose. The water pressure can cause the wires to stretch and break. The cell frame should be thoroughly rinsed along the edges to dislodge any trapped lint or dirt. Carefully wipe a damp cloth or sandpaper (not emery cloth) along the ionizing wires.
⇒ Stand the cells and pre-filters in upright position. Allow to dry two hours.

You may experience a slight discoloration of the aluminum collector cell plates after washing. This is a normal chemical reaction between the aluminum and detergent and will not harm your unit or affect its performance.

2. REPLACING IONIZER WIRES

Instances of ionizing wire breakage are minimal due to the constant tension design and fixed location of the ionizing wire supports. When an ionizing wire breaks, the efficiency of the EFB will decrease slightly. However, the unit will continue to operate with a broken ionizing wire as long as the broken wire has not caused a short circuit of the unit. Remove all loose and broken wires as soon as they are identified.
WARNING!

Electric Shock Hazard
Can Cause Personal Injury

We recommend contacting a qualified HVAC contractor for replacement parts and/or servicing.

Ionizing Wires are supplied in a coiled spring configuration, with a clinch nut on each end of the wire. Replacement requires a pair of needle nose pliers. Exercise caution in removing any broken wires in the cell. This will prevent accidental shorting of the cell and reduce the need for further maintenance.

Use the following procedure when replacing an Ionizing Wire:

1. Ensure that ON/OFF switch is in OFF position, remove the Pre-filter and the ionizer-collector cells from the unit.
2. Carefully remove all remains of the broken wire from the cell.
3. Grip the new wire at each end with your thumb and index finger. While stretching the wire to approximately 6” (152mm), allow one end of the wire to uncoil between your thumb and index finger.
4. Place one end of the wire in the slot where the stainless steel wire supports are located on the ionizing-collecting cell as viewed from the front of the cell. This support is partially covered by the cell brace in front of the support.
5. Grip the other end of the Ionizing Wire with needle nose pliers and insert the terminated end of the wire into the slot in the wire support on the opposite end of the cell. The wire should have sufficient tension to be self supporting and remain suspended between the slots in the wire supports.

LIMITED WARRANTY

Manufacturer warrants the equipment of its manufacture to be free from defects in workmanship and material for a period of 18 months after shipment, or if applicable, 12 months after initial startup of equipment, whichever occurs first. This warranty is limited, however, to the repair or replacement of defective equipment, which is returned, freight prepaid, to manufacturer's factory.

This limited warranty does not apply to any part or component that is damaged in transit or when handling, has been subject to misuse, negligence or accident, has not been installed, operated or serviced according to Seller's instructions, or has been operated beyond the factory rated capacity or has been altered in any way.

Manufacturer's liability is limited to replacement of defective parts or components and does not include any cost of labor (including, but not limited to, labor required to remove and/or reinstall any defective part) other than Trion factory labor.

Trion shall not be responsible for loss of use of any product, loss of time, inconvenience, or damage to other equipment or any other indirect or consequential damage with respect to property whether as a result of breach of warranty, neglect or otherwise.

THE WARRANTIES AND LIABILITIES SET FORTH ABOVE ARE IN LIEU OF ALL OTHER WARRANTIES AND LIABILITIES, EXPRESSED OR IMPLIED, IN LAW OR IN FACT, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE.

The foregoing shall constitute the total liability of Seller in the case of defective performance of all or any of the equipment or services provided to Buyer. Buyer agrees to accept and hereby accepts the foregoing as the sole and exclusive remedy for any breach or alleged breach of warranty by Seller.
Figure 2-Duct Size Change

20° Angle per side fitting, 4 in. per linear foot (1 M per 3 linear meters).

Air Handler Duct

Electronic Air Cleaner Array
Figure 3-Installing the Cell
# Parts List

<table>
<thead>
<tr>
<th>REF. NO.</th>
<th>DESCRIPTION</th>
<th>TRION PART NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Electronic ionizer/Collector Cell</td>
<td>441729-101C</td>
</tr>
<tr>
<td>2A</td>
<td>Prefilter (List Screen for two cell unit)</td>
<td>256677-001</td>
</tr>
<tr>
<td>2B</td>
<td>Prefilter (List Screen for single cell unit)</td>
<td>256677-002</td>
</tr>
<tr>
<td>3</td>
<td>HV Power Supply</td>
<td>256785-001</td>
</tr>
<tr>
<td>4</td>
<td>Interlock Switch</td>
<td>256031-001</td>
</tr>
<tr>
<td>5</td>
<td>HV Control Board Assembly</td>
<td>256679-001</td>
</tr>
<tr>
<td>6A</td>
<td>Transformer, 240 VAC, 50/60Hz (two cell)</td>
<td>239071-011</td>
</tr>
<tr>
<td>6B</td>
<td>Transformer, 240 VAC, 50/60Hz (single cell)</td>
<td>239071-012</td>
</tr>
<tr>
<td>6C</td>
<td>Transformer, 120 VAC, 50/60Hz (two cell)</td>
<td>239071-008</td>
</tr>
<tr>
<td>6D</td>
<td>Transformer, 120 VAC, 50/60Hz (single cell)</td>
<td>239071-013</td>
</tr>
<tr>
<td>7</td>
<td>Power Switch</td>
<td>253751-001</td>
</tr>
<tr>
<td>8</td>
<td>Air Flow Sensor</td>
<td>251367-001</td>
</tr>
</tbody>
</table>

Optional Accessories (not shown):
- Ionizer Wire: 220114-929
- Carbon Filter (For two cell unit): 256678-001
- Carbon Filter (For single cell unit): 256678-002

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[Diagram of the parts list with numbered parts 1 to 8]
Troubleshooting Guide

**WARNING**

**RISK OF ELECTRIC SHOCK**

These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

**WARNING**

**HIGH VOLTAGE**

Servicing this unit exposes dangerously high voltage. Only qualified service technicians should perform service.

Before troubleshooting the EFB, remove the prefilter. This will expose the safety interlock actuator located on the power supply tray. This safety interlock actuator must be pushed in to energize the EFB.

To better utilize the troubleshooting chart, follow the steps in order. Each time you isolate and fix a problem go back to start. Continue to repeat all steps until the EFB functions properly.

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1. **START**
   - Check electronic cells to ensure that they are clean, dry and properly installed.

2. **POWER "ON", "WASH" & "FAULT" LIGHT LIT.**
   - If yes, go to step 3.
   - If no, go to step 4.

3. **"WASH" AND "FAULT" LIGHT GO OFF ABOUT 30 SECONDS FROM START OF POWER ON.**
   - If yes, go to step 5.
   - If no, go to step 6.

4. **SHORT HIGH VOLTAGE COLLECTOR PLATE TO GROUND PLATE AND CHECK FOR ARC OR SNAPING SOUND.**
   - If yes, go to step 7.
   - If no, go to step 8.

5. **CONTINUE SHORT BETWEEN HIGH VOLTAGE COLLECTOR PLATE AND GROUND PLATE. "FAULT" LIGHT SHOULD COME ON IN ABOUT 30 SECONDS.**
   - If yes, go to step 9.
   - If no, go to step 10.

6. **PUBLIC ELECTRONIC AIR CLEANER IS OK.**

7. **OPEN POWER SUPPLY TRAY. CHECK FOR CORRECT INPUT VOLTAGE ACROSS PRIMARY TERMINALS ON POWER SUPPLY TRANSFORMER.**
   - If yes, go to step 11.
   - If no, go to step 12.

8. **TURN OFF AIR CLEANER AND REMOVE CELLS. TURN ON AIR CLEANER.**
   - If yes, go to step 13.
   - If no, go to step 14.

9. **CHECK FOR CORRECT SECONDARY VOLTAGE ON POWER SUPPLY TRANSFORMER TERMINALS.**
   - If yes, go to step 15.
   - If no, go to step 16.

10. **CHECK FOR CORRECT SECONDARY VOLTAGE ON AIR FLOW SENSOR OUTPUT. (AIR FLOW VOLUME EQUAL TO AT LEAST 30% OF RATED UNIT AIR FLOW MUST BE MAINTAINED TO ACTIVATE AIR FLOW SENSOR.)**
    - If yes, go to step 17.
    - If no, go to step 18.

11. **AFTER ABOUT 30 SECONDS, "FAULT" LIGHT GOES OFF AND "WASH" LIGHT STAYS LIT.**
    - If yes, go to step 19.
    - If no, go to step 20.

12. **INSPECT CELL(S) FOR:**
    - Broken ionizer wires
    - Damaged high voltage contact(s)
    - Warped or bent collector plates
    - Dirty or cracked insulators
    - If yes, go to step 21.
    - If no, go to step 22.

13. **REPAIR OR REPLACE CELL(S).**

14. **USING AN OHMMETER, CHECK FOR A SHORT BETWEEN:**
    - Cell frame and ionizer wire support
    - Cell frame and HV collector plates
    - If yes, go to step 23.
    - If no, go to step 24.

15. **SHORT**
    - Replace cell(s).

16. **NO SHORT**
    - Cell(s) ok.
### Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td><strong>Voltage and Frequency</strong></td>
<td>110/120V, 50/60 Hz</td>
</tr>
<tr>
<td></td>
<td>220/240V, 50/60 Hz</td>
</tr>
<tr>
<td><strong>Power Consumption</strong></td>
<td>45.1 W max @ 120 VAC</td>
</tr>
<tr>
<td></td>
<td>41.0 W max @ 220 VAC</td>
</tr>
<tr>
<td><strong>Current Draw</strong></td>
<td>0.45A @ 120 VAC</td>
</tr>
<tr>
<td></td>
<td>0.2A @ 220 VAC</td>
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<tr>
<td><strong>Temperature Ratings</strong></td>
<td>Operating Ambient: 40 °F to 125 °F</td>
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<tr>
<td></td>
<td>4°C to 52°C</td>
</tr>
<tr>
<td><strong>Temperature of Airflow Through Coils</strong></td>
<td>40 °F to 125 °F</td>
</tr>
<tr>
<td></td>
<td>4°C to 52°C</td>
</tr>
<tr>
<td><strong>Maximum Cell Washing Temperature</strong></td>
<td>180°F</td>
</tr>
<tr>
<td></td>
<td>82°C</td>
</tr>
<tr>
<td><strong>Electronic Cell Weight (each)</strong></td>
<td>11 lbs.</td>
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<tr>
<td></td>
<td>5.0 kg.</td>
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<tr>
<td><strong>Shipping Weight</strong></td>
<td>43 lbs. (Two Cell Unit)</td>
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<tr>
<td></td>
<td>19.6 kg</td>
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<tr>
<td></td>
<td>26 lbs. (Single Cell)</td>
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<tr>
<td></td>
<td>11.8 kg</td>
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<tr>
<td><strong>Installed Weight (Cells included)</strong></td>
<td>38 lbs. (Two Cell Unit)</td>
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<tr>
<td></td>
<td>17.3 kg</td>
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<tr>
<td></td>
<td>23 lbs. (Single Cell)</td>
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<tr>
<td></td>
<td>10.5 kg.</td>
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</tbody>
</table>
Contact Information

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