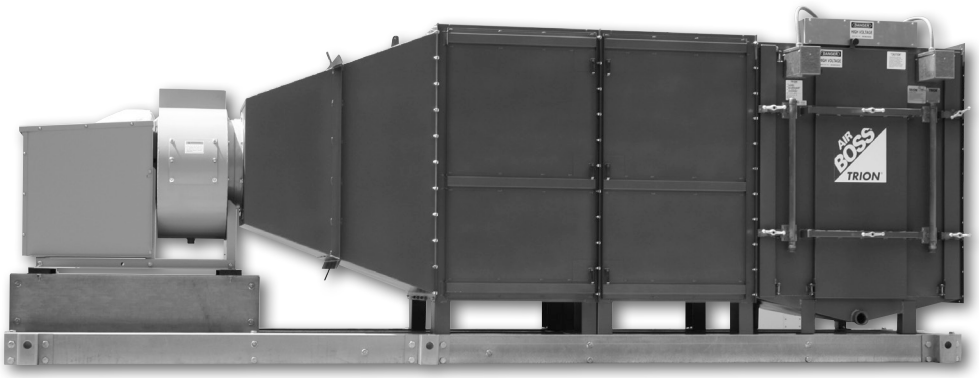
TRION®

Indoor Air Quality



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Air Boss® Model 75 Series

Electrostatic Precipitators
Commercial & Industrial Applications

Electrostatic Precipitators for Commercial & Industrial Applications

Air Boss® Model 75 Series

Table of Contents

This manual provides information for installation, operation, and service of your TRION Air Boss® Model 75 Series. Before installing and using the air purifier, carefully read these instructions to ensure maximum benefits from the unit and to avoid needless service costs that may result from improper installation and maintenance.

Design

FOR THE SYSTEM DESIGN ENGINEER

Introduction

The standard major components supplied with each unit for installation are as follows:

- Electronic air cleaner
- Controller / power supplies
- The detergent system
- Wash water line strainer and solenoid valve

The electronic air cleaner contains the ionizing-collecting cells (collecting elements), wash manifolds—located to the front and rear of each tier of cells—and metal mesh pre-filters and after-filters. Perforated plate or impingement type mist suppressors, in lieu of the metal pre-filters, are options when specified.

Gasketed access doors located on one side of the cabinet, 90 degrees to the direction of the airflow, provide entry for removal of the cells and filters. The location of the access doors, wash manifold drive motors and manifold header pipes may be specified as “right” or “left” handed. The hand designation is determined by standing in the ductwork on the air entering side of the unit so the airflow strikes your back.

The Pulse Width Modulated (PWM) power supplies provide the necessary high voltage for the air cleaner. The programmable logic controller (PLC) controls the initiating and sequencing of the wash cycle and filter. These are furnished in a NEMA 12 enclosure designed for remote mounting. The distance between the controller and unit must be determined as the interconnecting high voltage leads are furnished to a 50 foot length. Consult factory for distances greater than 50 ft. Cables are not to be spliced at any point along their length. In addition, the enclosure is a central junction for the primary wiring.

The detergent system is furnished as a completely assembled unit to be piped directly to the wash water supply, into the wash manifold headers.

Note: 30 or 55-gallon detergent tanks are available as an option.

Note: TRION Tridex Detergent is specially formulated for use with TRION electronic air cleaners. Use of other cleaners and detergents not specifically approved by TRION can cause possible failures in the unit and will void any and all warranties on our equipment.

The strainer and solenoid valves are to be installed in the wash water supply lines. A back flow preventer and/or check valves should be installed according to local code requirements. These items are not provided as part of the system accessories.

Design & Layout

The arrangement of the supplied components and the general layout of the system will vary according to application, adjoining equipment and available space. However, there are several basic factors pertaining to all installations that must be considered:

To maintain the selected cleaning efficiency, it is important to assure that the total air volume (capacity in CFM) is uniformly distributed across the entire face area of the unit. The metal mesh filters, perforated plate or mist suppressors provide some resistance to affect even air distribution. However, since most air ducts are designed to handle air velocities greater than the rated velocity of the air cleaner, it is necessary to properly transition any attached ducting. If possible, a contraction ratio of 1 in 3 (approximately 20°) should be maintained. If space prohibits, turning vanes, air baffles or other means may be utilized. Ducting – where attached to the cabinet collars – should be gasketed, caulked or otherwise made watertight.

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.

Contaminants to be collected – such as oils in vaporous state – must be condensed into particulate form prior to entering the ionizing-collecting cells in order to maintain the anticipated efficiency. Gases, vapors or any non-particulate cannot be precipitated

and will therefore pass through the air cleaner. Any condensing that takes place downstream from the air cleaner defeats the purpose. By the same token, heavy concentrations of water vapor, or other matter that becomes highly conductive when condensed, must be prevented from entering and/or condensing in the collecting elements to prevent electrical arc over and shorting.

CAUTION

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. INTERLOCKS ARE READILY AVAILABLE FROM THE FACTORY.

Waterwash drain lines from the cabinet drain basin should be trapped or otherwise sealed against the system pressure (in accordance with local codes). Wash water to the unit must meet the volume/pressure required for the specific unit involved. It must be between 40 PSIG Min. to 60 PSIG Max. at rated flow to provide proper spray patterns from the wash nozzles. The wash water MUST be Hot water (140°F recommended) and installed as close as possible to the unit and detergent system.

Note: The hot water tank is not provided by TRION.

Each installation varies according to needs, but normally the controller is located near the air cleaner. Ideal mounting height is at eye level for ease in reading the instrumentation and to facilitate service. Conduit runs in excess of 40 feet will need special considerations for wires supplied.

For ease in maintenance and component removal, adequate space must be provided in front of all access doors, motors, pump, and accessory equipment. Special consideration should be given in this respect for installations where the unit is suspended overhead. Catwalks or platforms should be provided.

CAUTION

IN ADDITION TO THE SPACE REQUIREMENT, INSTALLATION OF THE MODEL 75 IN NFPA APPLICATIONS SHALL HAVE A CLEARANCE OF AT LEAST 18 INCHES TO A COMBUSTIBLE MATERIAL, THREE INCHES TO A LIMITED COMBUSTIBLE MATERIAL, AND ZERO INCHES TO NONCOMBUSTIBLE MATERIAL. ANY REDUCTION IN CLEARANCE OR EXCEPTIONS MUST BE IN COMPLIANCE WITH NFPA AND ACCEPTABLE TO THE AUTHORITY HAVING JURISDICTION.

WARNING

***FIRE SUPPRESSION SYSTEMS:* EXTREME CAUTION SHOULD BE EXERCISED WHEN THIS UNIT IS INSTALLED IN APPLICATIONS THAT ARE COLLECTING VOLATILE OR POTENTIALLY FLAMMABLE CONTAMINANTS SUCH AS COOKING GREASE AND PETROLEUM-BASED OILS.**

***TRION STRONGLY RECOMMENDS* A FIRE SUPPRESSION SYSTEM BE INSTALLED IN THE DUCTWORK AND ON THE MODEL 75 IN CASES WHERE THESE CONTAMINANTS ARE COLLECTED ON THE CELL PLATES AND COLLECT ON THE ATTACHED DUCTWORK.**

CONTACT THE FACTORY FOR QUESTIONS OR CONCERNS REGARDING A FIRE SUPPRESSION SYSTEM.

Outdoor Installations

Requirements for outdoor protection vary in accordance to climate and equipment component arrangement for the particular job. The best approach for equipment protection is the construction of a heated shed or building over the installation. As an alternative, the installing contractor should treat the equipment as required to meet the specific needs. Detailed discussions of the Model 75 components are as follows, using a rooftop installation as an example.

Adjoining Ductwork (not supplied by TRION)
The ductwork located on the air entering side of the cabinet, between the point where it enters the roof and the cabinet, must be air tight to prevent the entrance of moisture, especially if it is under negative pressure. It must also be adequately insulated or other means taken to prevent the formation of condensation through temperature change. Condensation will short out the ionizing-collecting cells. Insulation must be of the outdoor variety.

TRION Model 75 Cabinet
The access doors on the Model 75 cabinet are gasketed and the unit is basically sealed against air leakage. The paint finish (epoxy) is for interior and exterior use. Like the air-entering duct, the cabinet must be insulated or other means taken to prevent condensation from taking place, which results in electrical shorting of the ionizing-collecting cells. Insulation, when employed, must be suitable for outdoor applications and when applied, consideration given to all access door openings and electrical interlock box covers.

Controller/PWM Power Supplies
As the controller/power supplies are designed for remote mounting, they can be, in many cases, located indoors and still be reasonably close to the main cabinet. If located outdoors with the cabinet, it must be weather protected. This includes the conduits that must be sealed internally from air infiltration around the wires.

Drain Line
The drain line, located under the ionizing/collecting cell access door at the lowest point of the TRION cabinet drain pan, should be piped with as short a run as possible to the heated interior of the building. Straight down from the drain pan discharge through the floor preferably. The normally recommended drain line trap, to seal off the cabinet from the drain against the system pressure, should be located in the heated interior. If not installed in this manner, heat wrap or other means should be employed to prevent freezing. Clean-outs are recommended to be installed in all drain lines.

Wash Water Supply Line
Naturally, the length of the run between the TRION cabinet and the heated building should be kept to a minimum. Preferably the line would go through the roof directly below each of the two manifold headers. The strainer, solenoid valves and back flow preventer should be kept indoors. Installed in this manner, a dumping valve can be included in the supply line to drain the remaining water and prevent freezing. The normally open dumping valve will be energized to close when the water wash solenoid valve is energized to open. The strainer and solenoid valves are supplied by TRION. The dump valve, back flow preventer, or check valve are to be supplied by others.

If the above method is not employed, the supply line and manifold headers must be kept from freezing with heat wrap or other means.

Detergent System
The detergent system, designed for remote mounting, should be installed indoors and piped to the water supply line within the heated interior. Detergent feed line should be piped with as short a run as possible and inject into the wash water supply line as close as possible and upstream from the Model 75 header connection points.

Contact the local TRION Sales Office or the factory if questions arise, or any additional information is required.

Installation

FOR THE INSTALLING CONTRACTOR

Unpack & 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 at the receiving point.

The unit cabinet is shipped completely assembled and, where size permits, the ionizing-collecting cells are shipped inside the cabinet. On large units, the upper tier of cells may be shipped in separate containers. The controller, detergent feeder and other separate accessories are shipped in the containers as noted on the packing list.

Position Equipment

To reduce weight for ease in handling, remove the pre-filters, after-filters and the ionizing-collecting cells from the cabinet, and place them safely aside. Position the cabinet in the designated location giving consideration to the following points:

1. 2' collecting cells require 30" clearance in front of the access door for cell and mechanical filter removal. 3' collecting cells require 40" clearance in front of the access door for cell and mechanical filter removal.
2. Level the cabinet to assure proper drainage from the drain pan.
3. Unless specific design features have been prearranged, the direction of airflow through the cabinet may be either from the right or the left. When the ionizing-collecting cells are reinstalled, the directional arrows on the cell end plates must concur with airflow through the cabinet. If mist suppressors have been specified, they are to be installed on the air entering side of the unit.

After the cabinet has been properly located, it may be secured into place at the predrilled factory mounting pads, either by bolting or welding.

Connect Adjoining Ductwork

Depending on the application, the installation plan may or may not call for adjoining ductwork on the air entering and/or air leaving sides of the cabinet.

When adjoining ducting is to be installed, the bottom of the horizontal duct runs should be relatively flat and sloped toward the cabinet drain pan for an 18-inch length. As a result, any wash water splash back occurring during the washing operation will run back into the drain pan.

Duct securement to the collar may be completed using the predrilled flange. The seam should be made air and watertight by caulking or gasketing.

When a blower is installed downstream from the TRION cabinet, the ducting between the cabinet and the blower will be under negative pressure and should be made air tight to prevent infiltration of contaminated air.

After the ductwork has been installed, clear remaining material or debris from inside ducts and bottom of cabinet, then re-install both the mechanical filters and the ionizing-collecting cells.

Note: Follow the directional arrows located on the cell end plates. The side of each cell containing the spiked ionizer blades must be located on the air entering side of the cabinet. The brass contact plungers on the cell should be inserted toward the back of cabinet. Also, mist suppressors, when specified, must be located on the air entering side of the cabinet.

Mount Detergent System

The detergent system should be located as close to the unit as practical, **but should not exceed 30 feet in elevation difference**. Service space must be provided for periodic manual filling of the detergent tank and to gain access to the pump and motor assembly. When positioned, the assembly may be secured in place at the predrilled factory mounting pads, either by bolting or welding. **Local disconnect at the tank is recommended for the pump motor.**

Connect Drain

Connect a drain line to the pipe coupling provided in the cabinet drain basin in accordance with the governing plumbing codes. The drain line must be sealed with a trap or other means to prevent air by-pass. If a trap is used, it should hold sufficient water column to overcome the system air pressure and to assure that loss of liquid from evaporation between cleaning periods will not break the seal. The drain line should not be smaller than the drainpipe coupling, or it will otherwise restrict the flow of water. Elevation of the equipment may be required to allow adequate draining. It is recommended that a drain header clean out be installed.

Connect Water Wash Supply

The items furnished to be included in the wash water supply are a strainer, electrically operated solenoid valves, and a detergent system.

Unless otherwise specified, the water wash supply should be hot (**140°F recommended; WATER HEATER NOT SUPPLIED BY TRION**) at the volume specified for the given unit, and at a full flow pressure between 40 and 60 PSIG at the wash manifolds.

WARNING

ACCURATE PRECAUTIONS SHOULD BE TAKEN IN THE EVENT THE WATER SUPPLY, DETERGENT SYSTEM, AND DRAINS ARE SUBJECTED TO FREEZING TEMPERATURES.

Although not required, a pressure gage and a manual service valve are recommended as shown in the diagram. The components should be located within the system to provide for service access.

Mount Controller

The Controller should be mounted at eye level and located within 40 feet of conduit run to the air cleaner, if using factory supplied wire. It must be mounted indoors out of the weather unless supplied with a weatherproof cabinet. Allow sufficient space in front of the access door(s) for service. Refer to appropriate Control/Remote PWM Box Outline Drawing for mounting conduit layout and dimensions.

Complete Wiring

High Voltage Wiring

WARNING

EXERCISE ALL THE NORMAL PRECAUTIONS WHEN WORKING WITH HIGH VOLTAGE AND COMPLY WITH NEC AND ALL APPROPRIATE LOCAL CODES.

The high voltage wiring entails interconnecting the power supply(s) to the ionizing-collecting cell(s) through the factory-installed junction box on top of the cabinet. All the wiring in the cabinet has been completed at the factory.

Refer to the Field Wiring Diagram. Two high voltage leads, one for the ionizer and one for the collector, are factory furnished at a 50-foot length. Each lead is to be run in separate conduit and must be of continuous run (do not splice) between the controller and the ionizing-collecting cell terminal connection in the junction box.

Primary Wiring

The Wash Controller is the main distribution point for all primary wiring. The various electrical components involved are connected to and powered from the controller. The interlocks are safety switches that prevent access to the charged high voltage components without first turning “OFF” the high voltage by interrupting the 24 VDC input to the PLC.

Grounding

An earth ground must be provided to the Model 75 cabinet and control. All ground connections must be in contact with bare metal and securely affixed. Ground conductor size and connection means will be in accordance with all applicable electrical code standards.

Check Out for System Start-Up

When the installation has been completed, assure that the equipment is ready for start-up by checking the following:

1. All construction debris is removed from the ionizing-collecting cells, drain basin and ductwork.
2. The inside of the controller and detergent tank are clear of any foreign materials.
3. The drain line from the TRION drain basin is clear and completely connected to its point of termination.
4. All piping is completed to the manifold headers and wash water is available.
5. Supply line power is available and electrical wiring is completed to the following components:

- Controller
- Solenoid Valve
- Detergent Pump Motors
- Manifold Drive Motors
- Electrical Interlocks
- Ionizing-Collecting Cells
- The System Fan

NOTE: DO NOT PUT THE INITIAL SUPPLY OF DETERGENT INTO THE DETERGENT TANK. THIS IS TO BE DONE AFTER VOLUME SETTINGS ARE MADE AT START-UP.

Operation & Service

FOR THE INSTALLING CONTRACTOR

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.

Introduction

The TRION® electronic air cleaner is technically known as an electrostatic precipitator. In this type of equipment, all airborne particles, even of microscopic size, are electrically charged (positively) as they pass through a high voltage ionizer. These charged particles are then attracted and adhere to a series of parallel collecting plates, which form the negative elements of an electrostatic field.

The ionizer consists of charged stainless steel spiked blades spaced between grounded electrodes. The collecting section consists of parallel plates arranged so that each alternate plate is charged while the intermediate plates are electrically grounded.

Periodically, depending on the type and concentration of contamination in the air, the contaminant is washed from the plates by the integrally constructed water wash system.

Three major functional components comprise the air cleaner:

1. Ionizing-collecting cells to ionize and collect airborne particulate matter.
2. Power supply(s) to supply high voltage direct current to the ionizing-collecting cells.
3. Control operated washer to automatically wash away the collected contaminant.

Normally, systems are designed for collection efficiencies in the range of 90 percent or more. Collecting a contaminant at these efficiencies, especially when there are high concentrations can result in large accumulations in a relatively short period. Therefore, maintenance must encompass two areas; the operation of the equipment for efficient collection and the systematic removal of the collected contaminant.

Description

The ionizing-collecting cells (contaminant collecting elements) are housed in the cabinet on slide rails. They can be removed from the cabinet as required, through the end access door, by sliding them out like drawers. On multi-cell units, all of the electrical connections between cells in a given tier are automatically made through spring plunger connectors. On the access end, the high voltage cables from the power supplies are connected to the junction box on top of the cabinet. The high voltage cables from the junction box to the individual tiers are factory wired. When installing cells into the cabinet, the directional arrows on the cell end plates must be correctly oriented. The side of the cell containing the spiked ionizer blades must always be located on the air entering side. The spring plunger connectors, located on one end of each cell, will always face toward the back of the Model 75 Cabinet.

Both the air entering and air leaving side of the cabinet contain either metal mesh filters or perforated plate, whichever was specified. These items act as trash screens, provide resistance for even air distribution, and help contain splash back from the integral water wash system.

The Power Supply(s) convert the 115 volt, 60HZ, single phase AC supply to the high voltage DC needed to power the ionizing-collecting cells. Potential of 13 KVDC are required for the ionizer sections and 6.5 KVDC for the collector sections of the cells.

The integral wash system consists of a series of spray nozzles soldered into oscillating water wash manifolds. The manifolds are located in the front and rear of each cell tier. They are oscillated through straight drive linkage powered by fractional HP motors. A detergent system is also incorporated into the wash system. The amount of detergent used for washing is readily adjustable, and that amount is dependent upon the type and amount of collected contaminant.

The washing operation is cycled periodically, and again the frequency is dependent on the type and amount of contaminant collected. The events in a wash cycle are:

- Power Supply(s) and System Fan “OFF”
- Washer and Detergent “ON”
- Washer and Detergent “OFF”
- Pause for Detergent to react
- Washer “ON” (without detergent for rinse)
- Washer “OFF”
- Pause for Drip Dry
- Blower “ON” for forced dry
- Blower “OFF”

The time span for all of the events is factory set when the equipment is initially ordered.

Initial Start-Up

1. Inspect the inside of the adjoining ductwork and TRION cabinet to be sure it is clean and free of any debris or construction materials. Especially note the opening in the drain basin for any restrictions. The ducting, where secured to the cabinet collars, should be sealed water tight either with gasketing or caulking.
2. Inspect the ionizing-collecting cells to see that all of the ionizing blades are intact, that no large pieces of foreign material are lodged between the plates, and that the cells are properly installed in the cabinet with the spiked ionizing blades located on the air entering side.
3. Check the high voltage leads to see that they are connected to the proper terminal both at the ionizing-collecting cells, the junction box and inside the controller.
4. Be sure that the drain lines from the TRION cabinet drain basin are completely connected and properly terminated to trap or floor drain. A trap or seal of some type should be incorporated in the line to prevent air bypass.
5. Check the water supply line to be sure water is

available and that the strainer, solenoid valves, and detergent system are properly installed and connected.

6. Be sure that electrical power is available, that the wiring is completed, and that the system blower is ready to energize.
7. Be sure that all access door interlocks are closed.
8. Close the system electrical supply switches, making power available to the TRION controller and the system fan.
9. Turn the controller selector switch to the “ON” position. Push “Filtration Mode” push button. The blower should run (if installed) and the power supply(s) should be energized. Electrical arcing within the ionizing-collecting cells may occur. It is a normal occurrence caused by accumulation of dusts from construction or other sources in the cell(s) and should subside quickly. If the arcing is continuous and does not subside, recheck the routing of the high voltage leads between the power supply(s) and the cell(s). Refer to the field wiring diagram. The ionizer lead must be connected to the ionizer and the collector lead to the collector.
10. Ensure the detergent tank is clean, and then fill the tank 1/4 full with clean water. Do not fill with the detergent until start-up adjustments have been completed.
11. **(Review this paragraph in its entirety before initiating the wash start button.)** Next, set the detergent volume setting per wash at the detergent feeder. Manually initiate the wash cycle by pushing the "Wash Mode" button on the control. The wash control duration is 70 minutes and by means of a factory preset programmable logic controller (PLC) will sequence the washing events as previously outlined. When the detergent pump is energized, note the amount that is used by observing the reduction in the liquid level in the tank. The usage should be approximately 1 part of detergent to 20 parts of water. The pump is a constant displacement type and the amount of detergent forced into the water supply to wash the unit is dependent upon the setting of the control valve in the bypass return line to the reservoir and hot water supply pressure. The side of the translucent reservoir is marked with volume markers. Adjust the control valve to obtain the correct usage for the given unit model, then secure the setting with the Allen head set screw located in the valve adjustment knob. When the correct adjustment has been made, remove the remaining water from the reservoir and fill the tank with initial supply of detergent furnished unless the Tridex concentration detergent is used.

System	Detergent Required (GPM) Per
75-102	.3
75-103	.4
75-104	.5
75-105	.7
75-106	.8
75-107	.9
75-108	1.1
75-109	1.2
75-110	1.3
75-203	.8
75-204	1.1
75-205	1.3
75-206	1.6
75-207	1.9
75-208	2.1
75-209	2.4
75-210	2.7
75-303	1.2
75-304	1.6
75-305	2.0
75-306	2.4
75-307	2.8
75-308	3.2
75-309	3.6
75-310	4.0

12. Program time clock for automatic wash.
    Press RESET to clear all previous stored settings.

General Information

The panel-mounted digital timer series included with the Model 75 can be operated in four separate power supplies, ranging from 240 VAC to 12 VDC. Output format can be produced to be volt-free or voltiac-output. Batteries of lithium CR2032 or rechargeable V80H are optional for retaining the programming during timer’s disconnected operating power.

The digital timer is accurate to the minute, designed with either six or eight ON/OFF (events) per day. It also provides 15 combinations of daily programs which can lead great convenience to users upon choosing the required days in a week for operating the timer.

Programming Functions
- TIMER: Programs review and setting programs
- MANUAL: To select “ON, AUTO, or OFF”
- CLOCK: To adjust current DAY and TIME
- DAY: To adjust day of week
- HOUR: To adjust hour
- MIN: To adjust minute
- Ⓡ: Reset timer’s setting
- LED: To indicate ON/OFF status

Press Ⓡ button to reset timer before programming.

Adjusting Clock
Press and hold CLOCK and then press DAY key, HOUR key, MIN key respectively to adjust clock of timer to accurate DATE, HOUR, MINUTE. In 12-hour format, PM and AM shall appear on LCD screen. In 24-hour format, LCD screen shall indicate 0:00 - 23:59.

Programming the Timer
1. Press TIMER key. LCD screen shall show 1^{ON}.
2. Press DAY key to select any of the 15 combinations of daily programs to your application demand. Continuing to press DAY key will cause the LCD screen to alternate among 15 combinations.
3. Press HOUR and MIN respectively to set desired hour and minute for 1^{ON}.
4. After finished setting 1^{ON}, press TIMER key again. 1^{OFF} should appear on the LCD screen.
5. Press DAY key to select any of the 15 combinations of daily programs to your application demand. Continuing to press DAY key will cause the LCD screen to alternate among 15 combinations.

NOTE: Day combinations chosen in each of the ON/OFF program periods must be consistent. Also, the OFF program time will be one minute after the start time setting for each period programmed.

6. Repeat programming procedure 3 to set desired hour and minute for 1^{OFF}.
7. When finished setting 1^{ON} and 1^{OFF}, press TIMER. 2^{ON} shall appear on LCD screen.
8. Repeat programming procedure above to complete the rest of ON/OFF program period event or just to the desired number of ON/OFF (event) setting for demand of practicable application.
9. When finished program setting (event), press CLOCK. Timer shall start to execute programs.

Reviewing Programs
Keep pressing TIMER, and the display on the LCD screen shall alternate display among each of 6 or 8 ON/OFF events.

Using Override Functions
Timer is designed with two override functions to widen its usage among practicable applications. Override function is only effective when timer is running in AUTO mode.

Temporary Override
Condition 1: When timer’s output status is ON, press MANUAL key to move indicator from AUTO to OFF. Timer output shall turn to OFF status, programs overrided. Press MANUAL again to switch timer status to AUTO. Timer’s output shall continue maintaining OFF. Timer shall resume its automatic operation when next program (event) calls for ON (with next opposite set point).

Condition 2: When timer’s status is OFF, press MANUAL key to move indicator from AUTO to ON. Timer status shall turn to ON status, programs overrided. Press MANUAL again to switch timer status to AUTO. Timer’s output shall continue maintaining ON. Timer shall resume its automatic operation when next program (event) calls for OFF (with next opposite set point).

Random Startup Override: Press and hold DAY key, and then press MIN key. There shall be a symbol “nn” that shows on the left corner of the LCD screen to indicate that this override is executing. When this override is being executed, the original programs will be stopped, and once every 10 to 120 minutes, timer shall automatically turn its output to ON status. Once again, pressing and holding DAY key and then MIN key shall terminate this override.

13. **Kitchen exhaust applications. For safe and proper operation adhere to the following instructions and procedures:**

a. Exhaust systems shall be operated during all periods of cooking in restaurant applications.
b. Filter-equipped exhaust systems shall not be operated with filters removed.
c. The posted instructions for manually operating the fire extinguishing system shall be kept conspicuously posted in the kitchen and reviewed periodically with employees by the management.
d. Listed exhaust hoods shall be operated in accordance with the terms of their listings and the manufacturers instructions.
e. Cooking equipment shall not be operated while its fire-extinguishing system or exhaust system is not operating or otherwise impaired.

Wash Control & Detergent System

Some dirt's being more tenacious than others are more difficult to remove and require a stronger detergent solution. Average settings have been factory set. Best possible settings for any given installation, however, are determined through experience. Determination can be made by visually examining the collecting elements after the first few times of washing.

To adjust the volume of detergent used within the given time setting, loosen the knurled knob with an Allen wrench on the control valve located in the by-pass line. Refer to the Detergent System Outline. Turning the knob clockwise increases the volume and counter clockwise decreases the volume. When adjustment has been made, be sure to retighten the setscrew.

Routine Maintenance

1. Washing Frequency
The frequency that the collected dirt is to be washed from the unit depends upon the type and amount of dirt in the air to be cleaned. Dirt which is greasy in nature tends to harden after collection and should be washed away often. Likewise, units operating under extremely heavy dirt loads should be washed more often as a large build-up of collected material will have a tendency to "blow-off" if permitted to remain on the collecting elements for long periods of time. In that the type and amount of dirt varies geographically (and from one location to another in any given area) it is recommended to start operation with a washing frequency of at least once a week. This schedule may then be altered as needed after visual examinations of the collected material contained on the ionizing-collecting cells. **Daily washing is not unusual for units operating on heavy welding fume, kitchen exhaust hoods or similar applications**. Wash start times should be within one hour time from end of cooking.

2. Detergent
Effective washing is dependent upon detergent. The detergent reservoir should be examined on a routine basis; a minimum tank level established and never permitted to empty. An empty tank not only means poor washing, but can also be detrimental to the pump. The inside of the tank should be kept clean, free from dirt and foreign objects. The detergent, as supplied by TRION, is formulated specifically for electronic air cleaners. If substitutes are used, they must be approved by TRION, so as to not void the warranty. They should be safe for use in ventilation systems and non-caustic, as 95% of the ionizing-collecting cells are constructed of aluminum, special high voltage insulation and gasket seals.

The ATS controller and remote PWM box both have LED indicating lights to show power to the PWM power supplies. Flickering or failed LED's indicate electrical arcing and/or power failure.

Periodic Maintenance

1. Water Wash System – Every 6 Months
The water wash spray pattern should be checked on each nozzle to be sure that a full spray pattern is developed. Distorted patterns are usually caused by dirt in the nozzle orifice, which can be cleaned by inserting a small gage, soft copper wire into the orifice. If any one manifold contains several nozzles that are restricted, the drain plug at the idler end of the manifold should be removed, after the nozzles have been cleaned, then the manifold flushed with clean water. The main supply line strainer and the strainer in the detergent system should be checked and cleaned. Check the wash manifold drive linkage connections and tighten or adjust as required.

2. Fire Suppression (IF INSTALLED) – Every 6 Months
Properly trained and qualified personnel shall complete inspection, cleaning and servicing of the fire suppression system.

All actuation components, including remote manual pull stations, mechanical or electrical devices, detectors, fire-actuated dampers, etc. shall be checked for proper operation in accordance with the manufacturers listed procedures. In addition to these requirements, the specific inspection requirements of the applicable NFPA standard shall also be followed. If required, certificates of inspection and maintenance shall be forwarded to the authority having jurisdiction.

3. Controller – Every 12 Months
The inside of the controller cabinet should be examined for accumulated dirt and dust. If required, the components should be cleaned using a good brand of electrical contact cleaner. All terminal connections should be checked for securement and tightened or reworked as required.

WARNING

DO NOT USE HIGH PRESSURE STEAM CLEANING EQUIPMENT TO CLEAN CELLS. THE EXCESSIVE HEAT AND PRESSURE WILL CAUSE THE PLATES TO WARP AND IN TURN POSSIBLY CAUSE EXCESSIVE ARCING.

4. Ionizing-Collecting Cell – Every 6 to 12 Months
Remove and inspect the ionizing-collecting cells for excessive dirt accumulations not removed by the integral washing system. Manually clean as required in a soak tank, commercial car wash, or with a pressure hose or pressure cleaner using a **low pressure setting**. At this time, particular care should be taken in cleaning each of the insulators.

5. Motors – Every 24 Months
As the operation of detergent pump motor is limited, frequent oiling is not required. Lubricate with several drops of SAE 10 motor oil every two years. DO NOT OVER OIL. The manifold drive motors are factory lubricated for life and do not require oiling.

6. Filter Devices – Every 4 to 6 Months
Hoods, impingers, metal mesh filters, ducts and other appurtenances shall be cleaned to bare metal at frequent intervals prior to surfaces becoming heavily contaminated with grease, oil or other contaminant. It may be advantageous to clean readily removable items, such as impingers, metal mesh filters or other permanent filter devices in a soak tank, with a pressure hose or pressure cleaner low setting. After cleaning to bare metal, components shall not be coated with powder or other substance.

When a cleaning service is used, a certificate showing dates of inspection and/or cleaning shall be maintained on the premises.

At the start of the cleaning process, electrical switches that could be accidentally activated shall be locked out. Components of the fire suppression system (if installed) shall not be rendered inoperable during the cleaning process.

Care should be taken not to apply cleaning chemicals on any fusible links or other detection devices of the automatic extinguishing system.

WARNING

FLAMMABLE SOLVENTS OR OTHER FLAMMABLE CLEANING AIDS SHALL NOT BE USED.

Troubleshooting

WARNING

EXERCISE THE USUAL PRECAUTIONS WHEN WORKING WITH HIGH VOLTAGE. THE MAXIMUM OPERATING OUTPUT FROM THE POWER SUPPLY IS 15,000 VDC @ 5.5MA. OR 11.0 MA. IF WIRED IN PARALLEL.

IF SAFETY SWITCHES ARE CLOSED AND CIRCUIT IS ENERGIZED, DO NOT TOUCH HIGH VOLTAGE. WHEN THE CIRCUIT IS DE-ENERGIZED, ALWAYS BLEED OFF REMAINING STATIC CHARGE WITH AN INSULATED HANDLED SCREWDRIVER BY SHORTING TO GROUND THE POINTS OF HIGH VOLTAGE DC POTENTIAL.

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.

1. Introduction

This section on troubleshooting provides a description of potential malfunctions, their cause, location and correction. A Troubleshooting Reference Chart listing the most probable causes and corrections follows the general text.

The electronic air cleaner is the unit within the system that has the highest efficiency collection rating and is also the one with the highest potential for malfunction. When a malfunction does occur, the outage is usually found in the electrical secondary circuit in the ionizing collecting cell(s).

Note: All repairs to the fire suppression system (if supplied) must be completed by the authorized fire control contractor.

Indicating lights are installed in the face panel of the control box to monitor the electrical operation of each power supply and the ionizing collecting cell(s) they energize. The quantity of power supplies per unit is dependent upon unit size with one or two power supplies for each ionizing collecting cell tier in height. Other than the basic hand tools, it is advantageous to have a volt/ohm/milliammeter with a 20 KVDC high voltage probe. These instruments are standard catalog items by several manufacturers.

2. Secondary Short Circuit

The most common outage is a short in the secondary circuit and is best located through the process of elimination. Symptoms are a flickering indicating light accompanied by an arcing noise in the ionizing collecting cell(s) or an indicating light that is not glowing. A flickering light with an arcing noise is an indication of a high resistance short circuit and a light that is not glowing is an indication of a dead short. (A light that is not glowing can also be an indication of an open circuit in the primary circuit. Refer to the paragraph on open circuits.) The short may be in the power supply, the high voltage cables or the ionizing collecting cell(s). To isolate the short to any one of these three components, proceed as follows:

WARNING

WHEN SAFETY INTERLOCK SWITCHES ARE CLOSED, DO NOT COME IN CONTACT WITH HIGH VOLTAGE COMPONENTS. THE OPERATING OUTPUT FROM THE HIGH VOLTAGE POWER SUPPLY(S) IS 12,600 VDC AND 6 MA. - 11.0MA.

WHEN THE POWER SUPPLY(S) IS DE-ENERGIZED THERE CAN BE 20 SECOND DELAY FOR THE VOLTAGE TO DECAY. ALWAYS SHORT FROM GROUND TO A POINT OF HIGH VOLTAGE WITH A PROPERLY INSTALLED JUMPER WIRE OR AN INSULATED HANDHELD SCREWDRIVER TO BLEED-OFF ANY REMAINING RESIDUAL CHARGE.

a. Disconnect both high voltage leads from their respective terminals in the power supply and support them away from any point of contact.
b. Energize the power supply:
   - If the light still flickers or does not glow, the trouble is indicated to be in the power supply. First, check the inline fuse mounted on the circuit board and replace if it is blown. Second, replace the power supply in its entirety.
   - If the light glows steady with the leads disconnected, the power supply is indicated to be normal.

Note: It will be necessary to close the access door electrical interlock switch operated by the access door and affix the junction box lid with hardware supplied to close the electrical interlock switch on the box, to complete the primary circuit to the power supply.

c. Next, reconnect both high voltage leads to their respective terminals inside the power supply and disconnect them at the ionizing collecting cell(s). Support them away from any point of contact and energize the power supply.
   - If either high voltage lead is defective the light will indicate the trouble. Each lead may then be checked separately by disconnecting them, one at a time, from their respective terminals at the power supply. When a lead is found to be defective, replace it in its entirety. Do not repair or splice.
   - If the light glows steady with the leads disconnected at the ionizing collecting cell(s) the trouble is then indicated to be in the ionizing collecting cell(s).

The trouble can then be isolated to, a single cell or the ionizing or collector section of a given cell as follows:

a. First determine if the short is in the ionizing section or the collecting section by connecting each high voltage lead to its respective section, one at a time, and energizing the power pack. (The lead not connected must be supported away from any point of contact.) The short symptoms will still exist for the section in which the short is located. If the trouble causing the short is bridging both sections, then the short will be indicated in both sections when they are individually connected.
b. When the short is isolated to a cell tier, remove all the cells within the tier and visually check the sections indicated to contain the short.
   - If the short is in the ionizer section, look for a broken or defective insulator.
   - If the short is in the collector section, look for a large piece of foreign material bridging the collector plates or a defective insulator.
c. If the short is indicated to be in both sections, it will probably be a foreign object bridging the air gap between the ionizer and the collector.

3. Open Circuits

Although open circuits can occur in the secondary they usually take place in the primary. If the unit contains only one power supply and the indicating light does not glow the outage is probably one of the following:

a. Supply line power to the control disconnected. Reconnect.
b. Open access door interlock in control of electronic air cleaner. Be sure all access doors are properly closed and secured.
c. Blown in line fuse located on the power supply circuit board. Replace Power Supply.
d. Outage in the power supply. Look for charred or burned components or a loose wiring connection. Replace power supply or reconnect wiring.
e. Defective indicating light. Replace light.

4. Other Malfunctions

Refer to troubleshooting reference chart on following page.

Spare Parts

Recommended spare part quantities are usually based on the unit size and the amount of units per installation. For specific recommendations, consult the TRION factory or nearest Sales Office. Consideration, however, should be given to stocking the following components.

Description	Quantity
PWM Power Supply	2
Junction Box Standoff Insulators	2
Cell Insulators	6
LED	2

Part Numbers are not listed as they are subject to change. When ordering parts, always state Unit Model and Serial Numbers.

Troubleshooting Chart

Problem/Symptom	Probable Cause	Location	Reason - Correction
Indicating Light Not Glowing	Short Circuit	Ionizing Section of Cell	1. Dirty insulators - clean 2. Defective insulators - replace 3. Foreign object between ionizing bar and ground electrode - remove
		Collecting Section of Cell	1. Dirty insulators - clean 2. Defective insulators - replace 3. Foreign material bridging plates - remove 4. Bent plates - straighten or replace cell
		High Voltage Leads	1. Disconnected high voltage lead contacting ground - reconnect 2. Defective lead/insulation breakdown - replace entire lead
		Power Supply	Charred/overheated components - replace power supply
Indicating Light Not Glowing	Open Circuit	Control	1. Disconnected supply line power - reconnect 2. Faulty indicating light - replace
		Power Supply	1. Blown fuse - replace power supply 2. Disconnected wire - replace 3. Charred/overheated components - replace power supply
		Electronic Air Cleaner Housing	1. Electrical interlock switch not closed - close access door 2. Junction box interlock switch not closed - secure cover 3. Faulty electrical interlock switch - replace
Indicating Light Flickering	High Resistance Short	High Voltage Circuit	1. Ionizer high voltage lead connected to plate section and plate lead to ionizer - reconnect leads 2. Loose or disconnected high voltage lead - tighten or reconnect 3. Loose or defective inter-cell connection (on multi-cell units) - tighten or replace 4. Foreign object adrift in ionizer or plate section of cell - remove

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TRION®

Indoor Air Quality

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