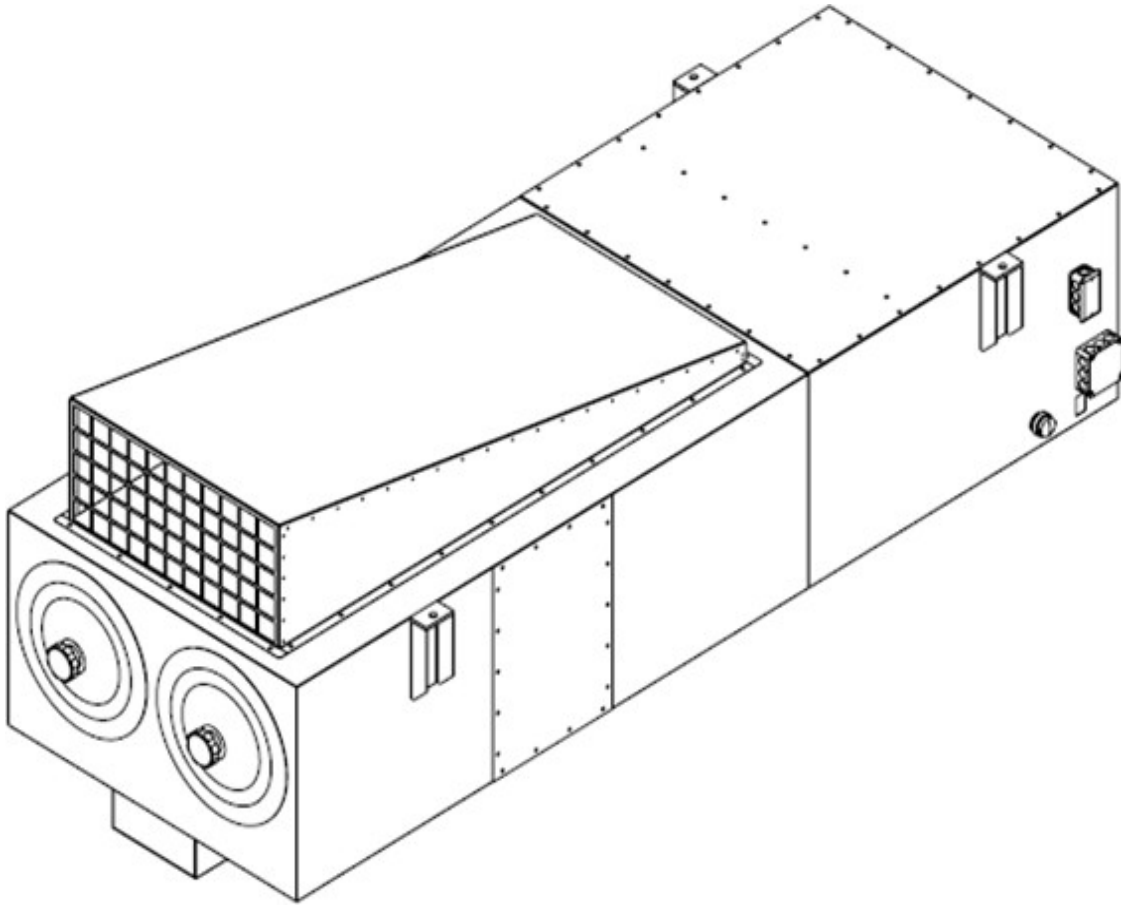


AQE4000

Overhead Cartridge System



**AIR QUALITY
ENGINEERING**

Air Quality Engineering Inc., has a policy of continuing product improvement and reserves the right to make changes in design and specification without notice.

Before you get started please review the following:

Purchase Date: _____

Serial Number: _____

Type of filter and AQE P/N: _____

Customer Technical Support:

To contact Air Quality Engineering use:

Mail: Air Quality Engineering
7140 Northland Drive N.
Brooklyn Park, MN 55428
USA

Phone: 1.800.328.0787
763.531.9823

Fax: 763.531.9900

e-mail: info@air-quality-eng.com

web: www.air-quality-eng.com

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Disclaimer

All statements, technical information and recommendations in this manual or related documents are believed reliable, but the accuracy and completeness thereof are not guaranteed or warranted, and they are not intended to be, nor should they be understood to be representation or warranties concerning the products described.

Specifications are subject to change without notice.

Does not meet California air cleaner regulation requirements; cannot be shipped to California.

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CAUTION

**** ANY ACCUMULATED DUST MAY BE HAZARDOUS AND POSE A POTENTIAL FIRE/EXPLOSION HAZARD ****

Combustible materials, such as aluminum, magnesium, paper, buffing lint, and dust must not be mixed or exposed to dust generated from grinding ferrous metals due to the potential fire hazard caused by hot sparks within the air cleaner/cartridge collector.

At no time should the air cleaner/cartridge collector be exposed to lit cigarettes or any burning objects.

When dust collectors are used to collect flammable or explosive compounds, the dust collector must be located outside the building. When collecting extremely flammable dusts, drums should be emptied at least once daily and properly disposed of. Installer should consult and comply with all national and local fire codes or any other appropriate codes when determining the operation of dust collector equipment. Dust collectors are not fire or explosion proof and do not include any fire extinguishing equipment.

Explosion relief vents are required for some applications. Dust collectors with explosion vents should be located on the outside of the building. Some applications may require additional spark arrestors or fire extinguishing equipment. Consult with your NFPA manual (to order your NFPA manual, call 1-800-344-3555), with your Air Quality Engineering, Inc representative or with your insurance company for more information. Air Quality Engineering, Inc can provide explosion relief vents upon special order.

Cartridge collection equipment should be kept clean at all times to avoid the accumulation of material except in the discharge drums.

SPECIFICATIONS

- IMPORTANT -

THE SPECIFICATIONS GIVEN IN THIS PUBLICATION DO NOT INCLUDE NORMAL MANUFACTURING TOLERANCES. THEREFORE, THIS UNIT MAY NOT MATCH THE LISTED SPECIFICATIONS EXACTLY. ALSO, THIS PRODUCT IS TESTED AND CALIBRATED UNDER CLOSELY CONTROLLED CONDITIONS AND SOME MINOR DIFFERENCES IN PERFORMANCE CAN BE EXPECTED IF THOSE CONDITIONS ARE CHANGED.

THE AQE4000 CAPTURES SMOKE, DUST, AND OTHER DRY AIRBORNE POLLUTANTS IN THE WORKPLACE. THE AQE4000 IS A SELF CONTAINED AND CONTINUOUS CLEANING CARTRIDGE AIR CLEANER THAT IS USED IN BACKGROUND AIR CLEANING TO PROVIDE HEALTHIER WORKING CONDITIONS.

DIMENSIONS: See figure 1

WEIGHT:	<u>Options</u>	<u>Weight</u>
	Unit	656 lbs.
	6" Dia Arm	47 lbs
	8" Dia Arm	72 lbs

CABINET: 16 Ga. Welded steel cabinet with a baked enamel paint.

FILTER CARTRIDGE: Four high efficiency cartridge filters. 12 3/4" diameter x 30".
1100 sq. ft. total. 99.8% efficient at .5 micron.

FILTER CLEANING: Self-Cleaning Reverse Pulse Jet System which utilizes two, one inch diaphragm valves. Requires 80-120 psi of shop supplied compressed air.

PULSE CONTROLLER: Standard pulse controller has pulse frequency adjustment from 15 seconds to 8 hours. Optional photohelic controller monitors the pressure differential across the filters and pulses the cartridges within the set differential pressure range.

MOTORIZED IMPELLER: Electronically commutated (EC) backward curved fan 208-480/60/3

POWER:

Pulse Controller:
Standard: 120 VAC, 60 Hz, 1 amp fuse
Photohelic: 120 VAC, 60 Hz, 3 amp fuse
Diaphragm Valve: 120 VAC, 60 Hz, .05 amps
Motor: 208-240V 9.2 amps max 3 phase
440-480V 5.3 amps max 3 phase

DIMENSIONS

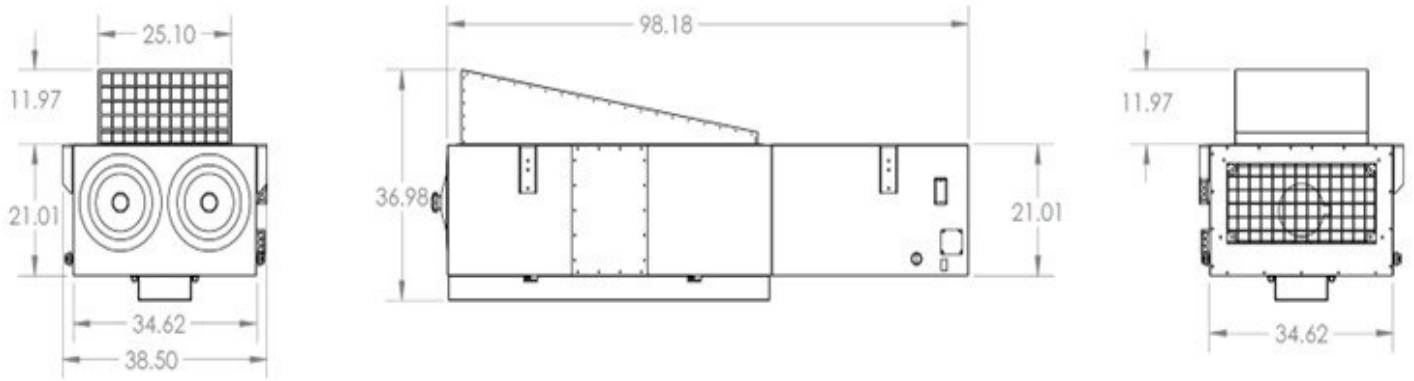


FIGURE 1 – DIMENSIONS

PLANNING THE INSTALLATION

- WARNING -

Air Quality Engineering, Inc. air cleaners are not explosion-proof. They must not be installed where there is danger of vapor, gas or dust explosion.

INTRODUCTION

Clean air is the subject of numerous laws and regulations. Typical requirements in the United States are those put out by the Occupational Safety and Health Administration (OSHA). Private groups, such as the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), have also published numerous recommendations.

Normally, clean air is defined in regulations and recommendations as air having a limited amount of contaminant in it, commonly expressed as parts per million or milligrams per cubic meter. Approved counteractions are intended to lower or eliminate the amount of contaminants in the air. One of the more common methods of achieving this goal is through the use of media air cleaners.

At no time should a media air cleaner be placed where there is a potential for explosion due to the presence of explosive dusts, gases or vapors.

Contact the nearest Air Quality Engineering, Inc., representative for assistance in determining the correct application of a media air cleaner.

SIZING

Sizing is that part of the installation which determines how many air cleaning units are required to maintain a desired level of air quality. The process of sizing an application involves roughly calculating the number of air cleaners needed and then modifying the calculation according to the specific characteristics of each application.

Since the AQE 4000 will be used for ambient air cleaning it will be strategically positioned overhead or mounted on stands to provide background air cleaning.

For background air cleaning, the number of media air cleaners needed can be estimated by the relationship of air volume to the needed air changes per hour. In these cases, the following formula is helpful:

$$\text{Air Cleaners} = \frac{\text{Air Volume} \times \text{Air Changes/Hour}}{\text{Clean Air Rating}}$$

Or reference our website:

<http://www.air-quality-eng.com/buyer-resources/air-cleaners-sizing/>

The air volume in a space is sometimes reduced to account for high ceilings and large equipment in the space. For example, in an application where the ceiling is higher than 30 ft. (9.1 m), the air volume above 30 ft. (9.1 m) may be subtracted if it does not significantly affect contaminant dispersal either by how the contaminants are circulated from their sources or how the heating, cooling or ventilating equipment affects the disbursement of the contaminants. Also, if equipment takes up a great deal of space in relation to the total air space, its' volume may be deducted from the total air volume.

A method for calculating the needed air changes per hour is to measure the generation rate of the contaminants and the suggested allowable level of contamination. To use this method of calculation, consult your Air Quality Engineering, Inc., representative.

Regardless of the method used to calculate the number of units needed to produce clean air, the physical conditions of the space to be cleaned may either limit this number or demand that more units be installed. For background air cleaning, it is important to establish a uniform airflow pattern

throughout the entire space. Limitations to the calculated sizing may be a lack of space for mounting areas or the number of units may interrupt normal building operation; that is, a unit cannot be mounted where an overhead crane will smash into it or where stand mountings seriously interrupt building traffic patterns. The number of units required by air volume and air changes per hour might need to be increased when the shape of a structure is such that effective capturing and air distribution is not possible according to the sizing calculations.

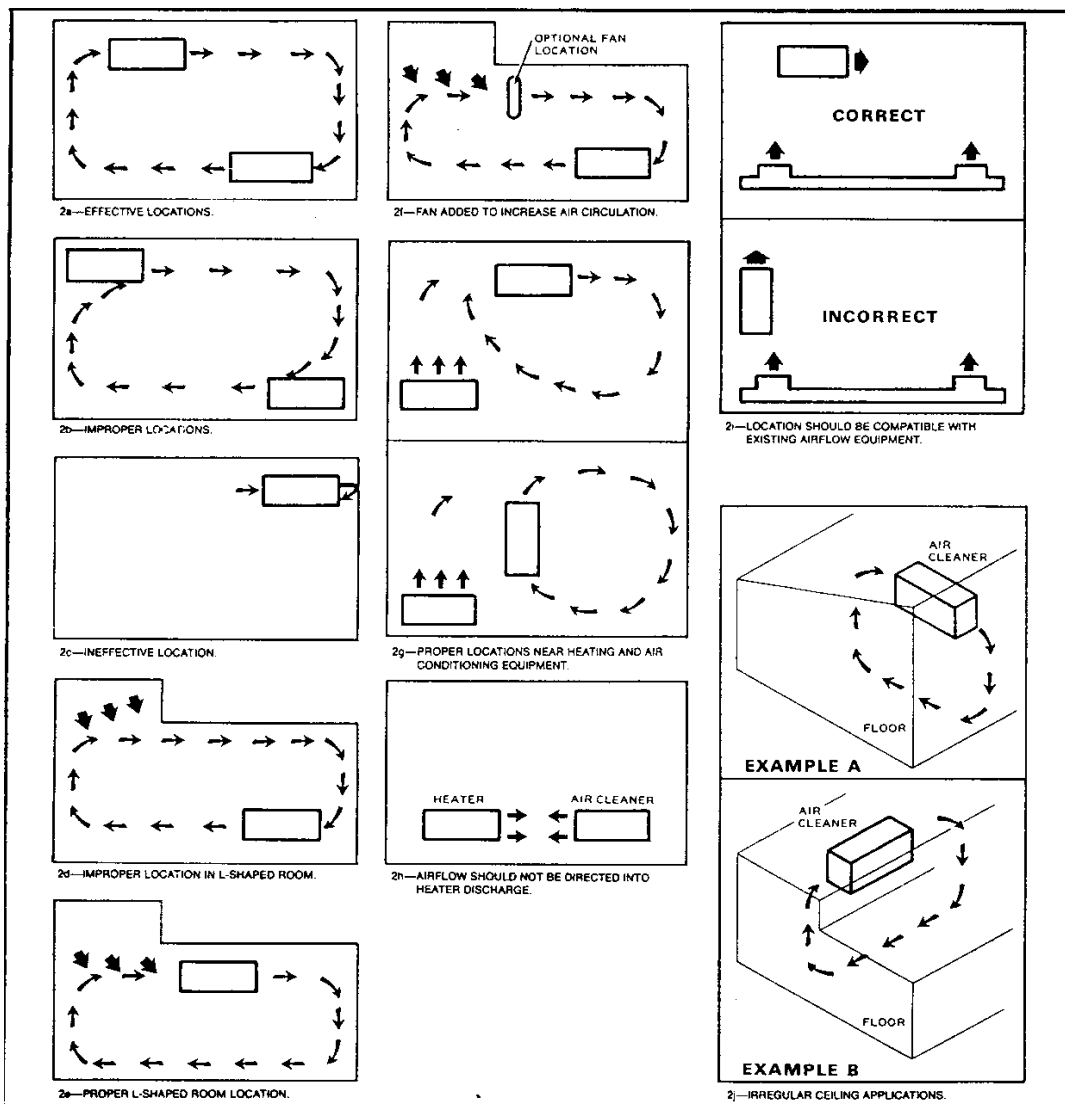


FIGURE 2 – GUIDELINES FOR LOCATING THE AIR CLEANER WHEN AMBIENT CLEANING

AMBIENT CLEANING

Whether an air cleaner is ceiling hung or placed on a stand, the first important consideration is that the inlet of the unit be located as close as is

reasonably possible to the greatest concentration of air contaminants. Second, since the air cleaner draws contaminated air from approximately 10 ft. (3.0 m) around the inlet and exhausts the cleaned air from 50 to 75 ft. (15.2 m to 22.8 m) from the outlet, the inlet of the unit should be placed 25

percent of the distance along the wall of a room.

See Fig. 3.

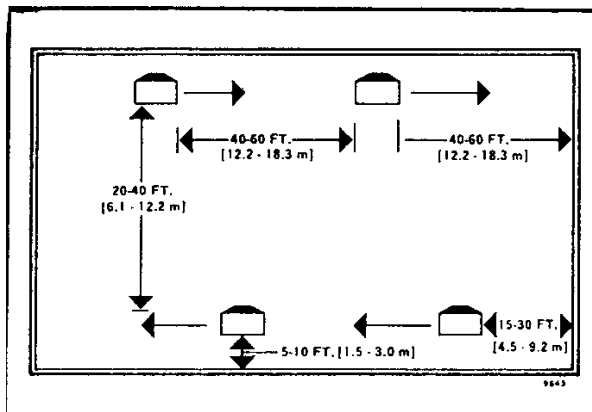
DO NOT locate an air cleaner inlet too close to the corners of a room. Contaminated air will be able to bypass the unit and not be cleaned. DO NOT locate an air cleaner outlet too close to a corner or wall. See Fig. 2 (2c). The cleaned air will recirculate directly back to the air cleaner inlet.

DO NOT locate an air cleaner in an L-shaped room so that exhausted air enters directly into the small portion of the room as shown in Fig. 2 (2d). This can produce a self-contained circular air pattern in the small part of the room that decreases the air cleaner's effectiveness. Locate an air cleaner in an L-shaped room as indicated in Fig. 2 (2e).

The shape of a room and location restrictions may require the installation of a fan as in Fig. 2 (2f) to promote proper air circulation. Also, the size of a room may require the use of fans to bring contaminants to an air cleaner inlet.

In rooms with irregular ceilings, install the air cleaner close to the ceiling on the highest wall as Example A indicates in Fig. 2 (2j). When one section of the ceiling is at least 12 in. (3-4.8 mm) higher than another, locate the air cleaner in the area with the higher ceiling as shown in Example B of Fig. 2 (2j).

When selecting locations for numerous units, position the air cleaners to create uniform movement of air and provide maximum access to the sources of contamination. The outlets of the air cleaners should not be located so that they generate opposing air currents or that the outlet from one air cleaner is less than 30 ft. (9.1 m) from the inlet of another air cleaner.



**FIGURE 3 – LOCATION GUIDE FOR
BACKGROUND CLEANING**

INSTALLATION

WHEN INSTALLING THIS PRODUCT

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.

UNPACKING

Check all air cleaner components carefully when unpacking for damage or missing parts. Remove all shipping cardboard. Be sure to inspect all packing materials before discarding them.

- CAUTION -

1. Do not connect the power source until after the air cleaner is mounted. This will prevent electrical shock or equipment damage.
2. Be sure to turn the air cleaner off before servicing it. The air cleaner motor may be equipped with an automatic thermal overload. Should the motor become overheated, it will automatically stop. It will automatically start after a sufficient period of cooling (several minutes to an hour).
3. If the air cleaner must be turned on for an electrical check, be extremely careful in avoiding electrical shock. Also, take care when working near the air cleaner's moving parts.

OVERHEAD MOUNTING

When installing the air cleaner in an overhead location, position the air cleaner as close to the contaminant source as possible. This increases the air cleaner's effectiveness. It is important to select an overhead mounting location for the air cleaner that provides easy access for filter maintenance. Do not place a ladder against the air cleaner when it is mounted overhead in order to gain access to the air cleaner interior.

Be certain that the mounting hardware (not included) from the air cleaner to the ceiling provides adequate strength and stability and that it is securely attached to the overhead structure. Do not fasten the air cleaner to a false ceiling, to plaster or to plasterboard. In some cases, it may be necessary to construct supports that will bear the weight of the air cleaner when it is hung in an overhead location. We recommend using 1 ½" x 1 ½" x 1/8" steel angle.

Supports from the air cleaner to the ceiling should be diagonally braced to keep the air cleaner stable when the source capture arm(s) is moved.

The bottom of the air cleaner should be mounted higher than 10' from the floor. A forklift is recommended for installation of the dust collector

PNEUMATIC HOOKUP

Note: The air supply must be free of oil and moisture. Purge the air lines to remove any debris before connecting to the air manifold.

Run a 1" pipe size, compressed air supply line to the unit. The air line should be equipped with a manual shutoff valve, filter, air regulator and pressure gage all located close to the unit. If the unit is to be installed in an area where freezing temperatures are to be expected, an air dryer capable of drying the compressed air to below the dew point must be provided. Use Teflon tape on all the air fittings to insure an airtight integrity.

Pressurize the system to 90-105 psig, and check for leaks. Then close the manual shutoff valve, and bleed the air from the line and air reservoir.

ELECTRICAL HOOKUP

- CAUTION -

This procedure should be attempted only by persons qualified to install electrical wiring.

Note: All electrical work needs to be performed by a qualified electrician in accordance with local city and state regulations.

The electronic timer box requires 115 Vac for operation. An ON/OFF switch should also be installed and three wires run from the electronic timer box to the solenoid valves, one common run to the neutral inside the electronic timer box, and 1

from each of 2 of the 4 outputs inside the box. (Note: not all 4 outputs are used; you can use the first two outputs, or for doubling the maximum offline, use outputs 1 and 3. The program jumper adjusts the number of outputs used. See Fig. 12.) The diaphragm valves wire connections are located in a 2" x 4" electrical box mounted on the side of the blower compartment. Do not connect anything to terminals A, B and C inside the electronic timer box. The electronic timer box should be mounted where it will be convenient to access.

The blower motor requires either a 208-240 or 440-480 Vac, three phase line for operation. The blower motor has automatic overload protection so there is no need for additional thermal overload protection. There is on/off switch and potentiometer speed control on the air cleaner to control the fan. The blower motor wire connections are located in a 4"x4" electrical box mounted on the side of the blower compartment.

CHECKOUT AND OPERATION

CHECKOUT

Before operating the air cleaner, check out the installation using the following procedures:

1. Check that the filters are in place and that the filter doors are tight.
2. Observe that the duct work is properly mounted and out of the way of forklifts and other machinery.
3. Double check the air line connections and the air fittings in the control box and on the unit.
4. Check that all electrical connections are properly mounted and that they meet local codes.

OPERATION

1. Turn on the air supply to the air reservoir and adjust to 90-105 psig. This is the proper setting for efficient filter cleaning.
2. The settings within the timer box have been preset at the factory. The OFF timer controls the length of time between pulses and the ON timer controls the duration of the pulse. The OFF timer can be adjusted for up to 16 hours of operation between pulses.

3. Turn on the power to the control box. The line pilot lamp should light. If it doesn't, check the fuse, the ON/OFF switch, and the power panel.

4. Close the door of the control box and tighten all door clamps.

5. Turn the power to the blower and turn potentiometer handle clockwise. Select desired speed rotating the handle.

6. Check the exhaust. Exhausted air should be relatively clean. If a leak has developed, it will be first noticed after a cleaning pulse as a puff of dust.

Note: If the dust collector does not appear to be operating properly, refer to the Troubleshooting section.

SERVICE

- CAUTION -

Always disconnect the power to the air cleaner before working on or near the air cleaner.

Do not place a ladder against the air cleaner when it is mounted in an overhead position. A lift platform should be used to gain access to the air cleaner for filter removal and servicing.

The air cleaner was designed to support only the weight of the internal components; motor, blower, and filters. Do not climb in or on the air cleaner. Failure to heed this warning could result in damage to the air cleaner or bodily injury

The dust collector does not require routine maintenance. However, it is advisable to check daily to see that the electrical power and compressed air are still supplied and that the air valves are opening and closing properly. It is also advisable to check that the collected material is flowing freely into the dust drawer.

DUST DRAWER MAINTENANCE

Do NOT use the dust drawer as storage for the collected dust. It is simply a large funnel from which the dust must be removed on a continual basis. If dust is allowed to collect in the dust drawer, it will get redeposited on the filters and shorten their life.

Always empty the dust drawer before it completely fills. The dust collector must be shut off to empty the drawer.

FILTER MAINTENANCE AND SERVICE

Pressure drop across the filters normally increases rather rapidly when the filter elements are new and clean but then climbs much slower throughout the rest of their filter life.

FILTER REPLACEMENT

Note: Remove ALL Filters before installing the new filters.

1. Shut off the electrical power to the blower and the reverse pulse controller.

2. Remove the access doors by unscrewing the knob, and place the doors out of the way. Check the seals on the doors to make sure they are in good condition.

3. Rotate the filters to break the seals. This will also allow dust from the top of the filters to drop free. Remove the filters from the unit and place into bags.

4. Examine the tube sheet and make sure the gasket sealing area is free of any dust and debris to insure a proper seal for the new filters.

5. Install the new filters gasket side first. Replace the filter doors and hand tighten.

EXTENDING CARTRIDGE LIFE

Note: Do NOT reuse damaged filters because filtering efficiency will be compromised.

1. Cartridge life can be extended by manually blowing out the cartridge filters

2. To manually clean the filters, remove the filters from the AQE 4000 and blow the dust off using a handheld blow gun attached to a shop air line. Air flow should be directed from the inside of the cartridge to the outside of the cartridge.

TROUBLESHOOTING

A) CLEANING CYCLE WILL NOT START OR WILL NOT REPEAT

1. Open the electronic pulse controller. Adjust the OFF time of the electronic timer. Turning the OFF time counter-clockwise will shorten the length of time between pulses. Turn the power to the electronic pulse controller on. The first LED light should flash and the unit should pulse. A few minutes after this (with the OFF timer turned fully counter-clockwise) the second LED should flash and the unit should pulse again. If the LED lights do not flash, see if the line input fuse is intact and be sure the board is receiving power. If the fuse is bad, replace it. Do not replace the fuse with a larger capacity fuse. Damage to the circuit board will result.

2. Check the pressure in the air reservoir. It should be between 90-105 psi.

3. If the electrical circuit checks out but a diaphragm valve is still not functioning, the problem is with the diaphragm valve or the solenoid on the diaphragm valve. Turn the power to the control box off. If the valve is continuously releasing air open the diaphragm valve and look for cracks in the diaphragm. If a crack or leak that cannot be repaired is found, the valve must be replaced. If no leak is found, go to #4.

4. If a closed valve will not open, then depressurize the air reservoir. Remove the four screws holding the main body of the solenoid valve together. Inspect the internal parts for operation. If dirt is the problem, clean the parts and reassemble. If the internal parts of the diaphragm valve are excessively worn or not smoothly operating a diaphragm rebuild kit will need to be ordered or the diaphragm valve will need to be replaced.

B) INSUFFICIENT AIR FLOW

1. Increase the fan speed by rotating the potentiometer handle.

2. Make sure that the arms or ducts are mounted tightly to the unit and that there is no leakage between the unit and arms or ducts.

3. Make sure that the fan exhaust grille is not blocked. Fan exhaust grille should be free of debris.

4. Make sure that the filter cartridge themselves are not too plugged with particulate. If they appear to be plugged, confirm that the units are pulsing properly and that the air pressure in the air reservoir is between 90-105 psi.

5. Check the dust drawer to confirm that it is not overflowing.

6. Make sure there is no blockage in the arms or ducts.

7. Confirm the dust drawer is securely attached and the gaskets are intact.

C) EXCESSIVE DUST DISCHARGING OUT OF EXHAUST

Note: It is normal for a small amount of dust to exit the air cleaner while reverse pulsing.

1. Make sure that all 4 filter cartridges are properly installed and that the gaskets on the filter cartridges are intact.

2. Confirm the filter cartridges are not dented, deformed or otherwise damaged.

3. Confirm that the access covers are securely attached.

ELECTRICAL SCHEMATICS

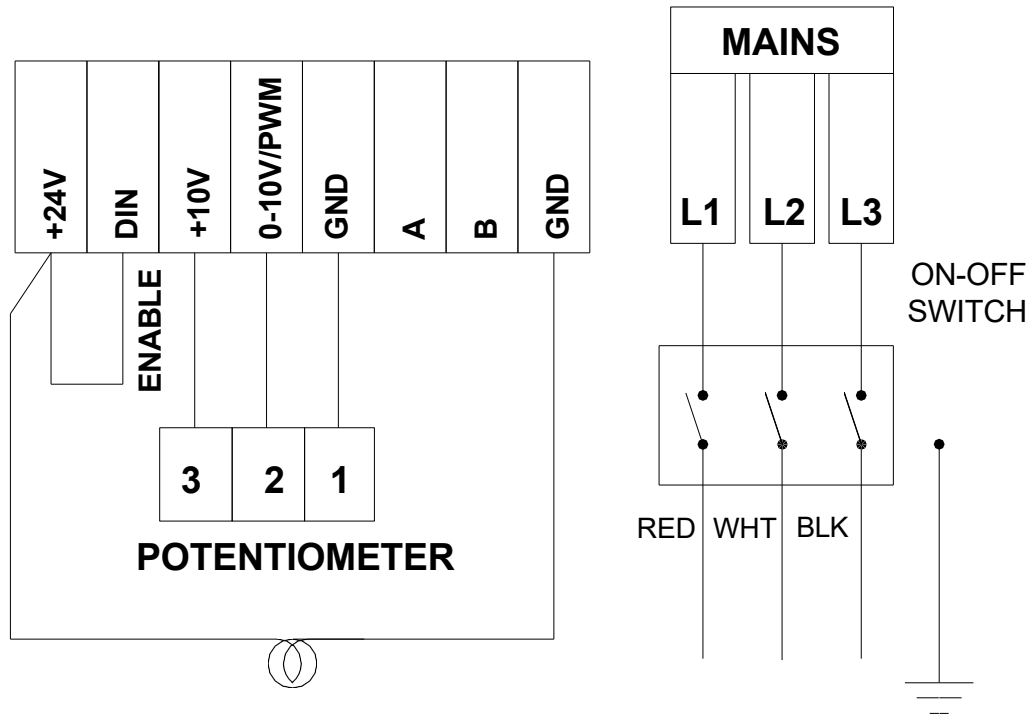


FIGURE 10 - BLOWER SCHEMATIC

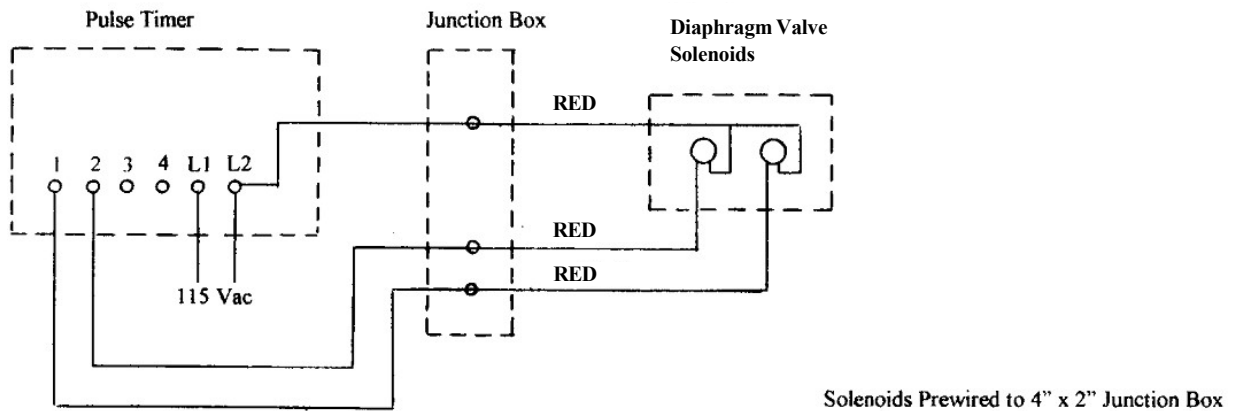


FIGURE 11 - ELECTRONIC PULSE TIMER / SOLENOID SCHEMATIC

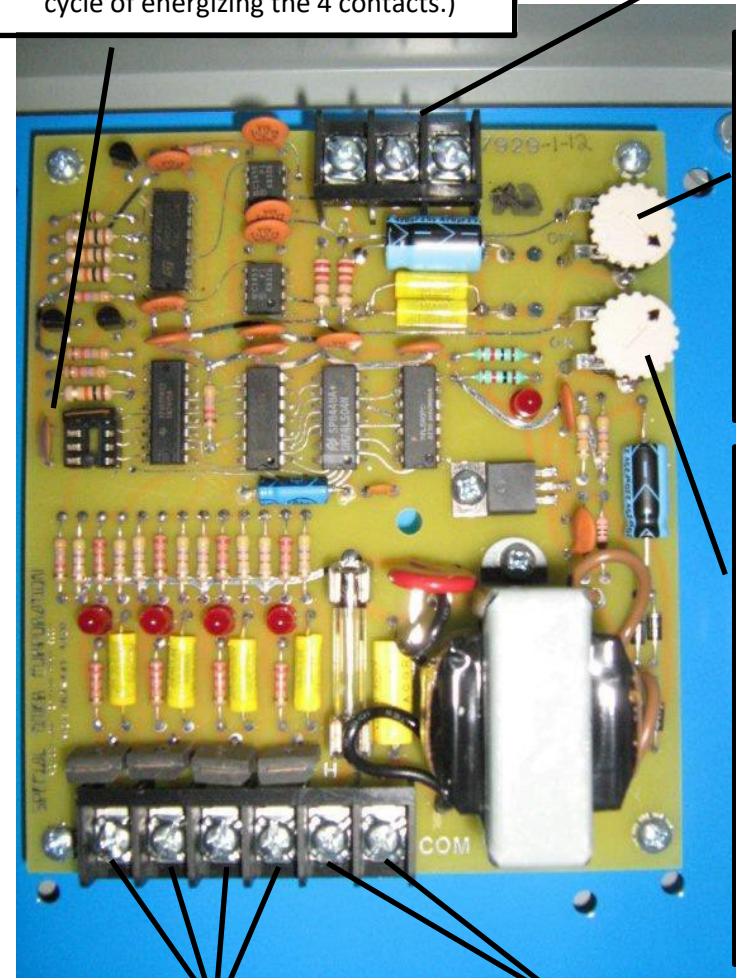
Jumper - sets which contacts are energized when pulsing. Pulsing starts at contact 1 and ends at the contact the jumper is set at. (If the jumper is set at 4 and the OFF is fully counterclockwise it will take 24 hours to complete the full cycle of energizing the 4 contacts.)

Standard setup has no jumpers or wires attached here.

(Off) Recommended Factory Setting: 5 O'Clock
(Fully clockwise is 8 hours between energizing of each contact. Fully counterclockwise is 2 minutes between energizing of each contact. Clockwise increases the OFF time between energizing of each contact. Counterclockwise decreases the OFF time between energizing of each contact.)

(On) Recommended Factory Setting: 2 O'Clock
(1/10 of a second)

(This setting should keep the valve open long enough to clean the filter. If the knob is turned too far counter clockwise the valve won't stay open long enough to clean the filters. If the knob is turned too far clockwise the valve will be open for too long. Clockwise increase the ON time or how long the valve is OPEN. Counter clockwise decreases the ON time or how long the valve is OPEN.)



Solenoid Contacts (Hot Contacts, neutral is wired directly to

Power Contacts

FIGURE 12 - ELECTRONIC PULSE TIMER CIRCUIT BOARD

PARTS LIST

NO.	DESCRIPTION	PART NO.
1	Impeller Industrial EC 3 Phase	40086
2	Potentiometer for EC Impeller	10347
3	Optional Photohelic Control Board	10268
3	Pressure Module for 10268	10269
4	Standard Electronic Timer Circuit Board	10255
5	Diaphragm Valve with Built in Solenoid (2 required per AQE 4000)	10353
6	Cellulose blended Cartridge with 275 sq. ft. of filter media (4 per machine)	41115
7	Flame Retardant Cartridge Filter with 275 sq. ft of filter media	41116
8	HO Treated Polyester Cartridge	41213
9	On/Off Switch	10350

CERTIFICATE OF WARRANTY

THREE-YEAR LIMITED WARRANTY

Air Quality Engineering, Inc. (AQE), warrants to the original purchaser, subject to the conditions below, that if the "Product" covered by this warranty should fail to perform by reason of improper workmanship or material, AQE will during the period of three (3) years from the date of original purchase either (i) replace the product or (ii) provide all necessary parts to repair the product without charge. The decision to replace the product or the necessary parts shall rest solely with AQE. This three-year limited warranty does not apply to main filter elements. AQE will replace without charge the main filter elements during the period of thirty (30) days from the date of original purchase if the main filter elements fail to perform by reason of improper workmanship or material. This warranty is valid only under the following conditions:

CONDITIONS

1. **REGISTRATION:** The purchaser's completion and mailing of the Registration Card to Air Quality Engineering, Inc., 7140 Northland Drive North, Minneapolis, Minnesota 55428-1520 within 30 days of original purchase.
2. **AUTHORIZATION:** The purchaser will contact AQE at (800) 328-0787 for authorization, returned goods number (RGA) and the shipping address. AQE will direct the purchaser to either return the necessary parts or the product at AQE's option.
3. **PROPER DELIVERY:** The shipping, freight prepaid or delivery of the parts or the product to AQE in either its original carton or in a carton assuring similar protection of the product with the returned goods number (RGA) clearly displayed on the outside of the carton.
4. **UNAUTHORIZED REPAIR:** A showing by the original purchaser that the product has not been altered, repaired or serviced by anyone other than an authorized service technician using genuine AQE parts.
5. **UNAUTHORIZED PARTS:** A showing by the original purchaser that the product has had only genuine AQE parts and filters used in its operation and maintenance.
6. **SERIAL NUMBER INTACT:** A showing by the original purchaser that the serial number has not been altered or removed.
7. **MISUSE:** A showing by the original purchaser that the product has not been involved in an accident, freight damaged, misused, abused or operated contrary to the instructions contained in the Owner's Manual.

Air Quality Engineering, Inc.'s, sole responsibility shall be to repair or replace the product within the terms stated above. AQE SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL DAMAGES RESULTING FROM ANY BREACH OF WARRANTY, EXPRESS OR IMPLIED, APPLICABLE TO THIS PRODUCT. Some states do not allow the exclusion or limitation of consequential damages so this limitation may not apply to you.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, AND THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY EXCLUDED BEYOND THE THREE-YEAR DURATION OF THIS WARRANTY. Some states do not allow limitations on how long an implied warranty lasts so the above limitation may not apply to you.

This warranty gives you specific legal rights and you may also have other rights that vary from state to state.

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MANUFACTURER & WORLDWIDE DISTRIBUTOR OF SMOKEMASTER® AIR CLEANING SYSTEMS

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