

ULTRA-FLOW™

“VS” Series Baghouse Dust Collector

OPERATION MANUAL

December 21, 2010 (rev11/26/2021)

Includes Installation, Operation and Service Instructions

IMPORTANT

This manual contains specific cautionary statements relative to worker safety. Read this manual thoroughly and follow as directed. It is impossible to list all of the hazards of dust control equipment. It is important that use of the equipment be discussed with a QAM Representative. Persons involved with the equipment or systems should be instructed to operate in a safe manner.

ULTRA-FLOW DUST COLLECTOR SPECIFICATIONS

IMPORTANT: On initial start-up, record the pressure drop indicated by the black needle on the differential pressure gauge or the digital readout on the timer-controller board. Store the initial pressure reading in a safe place (i.e. in the control panel with other important documents).

MODEL: "VS" series Advanced Technology, Hi-Tech, high-ratio baghouse style dust collector.

INPUT VOLTAGE: 120 Volt AC for model pulse cleaning control panel

CABINET DIMENSIONS AND WEIGHTS:

See the specification sheets, as part of this document.

FILTER AREA:

See the specification sheets, as part of this document.

COMPRESSED AIR REQUIREMENTS (at 2 grains per cu.ft. loading and 85 psig at factory settings):

- 34 SCFM from a 3/4 inch shop air line
- Minimum air line 3/4 inch at 85 psi maximum.
- 3/4 inch NPT Female fitting is standard for shop air attachment. Located above inlet duct connection and opposite side of collector. Use either connection, whichever is easiest access. The other can be use for blow-out cleaning of manifold/header.
- Clean, dry, compressed air at the correct pressure is required for the cleaning system to operate correctly. It is recommended that a pressure regulator and coalescing filter be installed between the compressed air source and the inlet to the dust collector.

REPLACEMENT PARTS

ITEM	PART NUMBER	DESCRIPTION
1	B666	Bag filter <i>models 36VS-5, 48VS-5, 60VS-5</i>
	B696	Bag filter <i>models 36VS-8, 48VS-8, 60VS-8, 72VS-8, 84VS-8, 96VS-8</i>
2	C666	Wire bag cages <i>models 36VS-5, 48VS-5, 60VS-5</i>
	C696	Wire bag cages <i>36VS-8, 48VS-8, 60VS-8, 72VS-8, 84VS-8, 96VS-8</i>
3	OR-5	Orifice plate <i>36VS-5, 48VS-5, 60VS-5</i>
	OR-8	Orifice plate <i>36VS-8, 48VS-8, 60VS-8, 72VS-8, 84VS-8, 96VS-8</i>
4	DP25	Diaphragm valve
5	PD25	Bulkhead connector
6	MX-6-300-2MF	Matrix wiring set <i>models 36VS-5</i>
	MX-6-300-3MF	Matrix wiring set <i>models 36VS-8, 72VS-8</i>
	MX-7-300-3MF	Matrix wiring set <i>models 84VS-8</i>
	MX-8-300-2MF	Matrix wiring set <i>models 48VS-5</i>
	MX-8-300-3MF	Matrix wiring set <i>models 48VS-8, 96VS-8</i>
	MX-10-300-2MF	Matrix wiring set <i>models 60VS-5</i>
	MX-10-300-3MF	Matrix wiring set <i>models 60VS-8</i>
7	2010D	Magnehelic Gauge
8	14F11BB / PS417BP	Mini-air line filter with bracket
8A	PS403P	Replacement filter for dust trap 14F11BB
9	<i>[For Continuous cleaning models]</i>	
	DCT506A-WP	Timer board and housing <i>models 36VS-5, 36VS-8</i>
	DCT510A-WP	Timer board and housing <i>models 48VS-5, 48VS-8, 60VS-5, 60VS-8</i>
	DCT622-WP	Timer board and housing <i>models 72VS-8, 84VS-8, 96VS-8</i>
	<i>[For On-Demand cleaning models]</i>	
	DCT-1006-WPP	Timer Controller with housing <i>models 36VS-5, 36VS-8</i>
	DCT-1010-WPP	Timer Controller with housing <i>models 48VS-5, 48VS-8, 60VS-5, 60VS-8</i>
	DCT-1022-WPP	Timer Controller with housing <i>models 72VS-8, 84VS-8, 96VS-8</i>
10	DCP100A	Pressure module

ULTRA-FLOW DUST COLLECTOR INSTALLATION

CAUTION

- Avoid mixing combustible materials, such as buffing lint, paper, wood, aluminum, and magnesium dust, and with dust generated from grinding ferrous metals due to the potential fire hazard caused by sparks in the dust collector.
- Under no conditions should the persons operating the dust collector be allowed to put cigarettes or any burning object into the hood or ducting of any dust collector system.
- All users of Ultra-Flow Dust Collector Equipment should comply with all National and Local Fire Codes and/or other appropriate codes when determining the location and operation of dust control equipment.
- When dust collectors are used to collect flammable or explosive dusts, the dust collector should be located outside the building. Also, an installer of fire extinguisher equipment, familiar with this type of fire hazard and local fire codes, should be consulted for recommendations and installation of the proper fire extinguishing equipment. Dust collectors do not contain fire extinguishing equipment.
- Explosion relief vents are required on some applications. Consult with an insurance underwriter or a NFPA Manual to determine proper vent size ratio. Vents installed on dust control equipment within a building, must be vented to the outside to minimize chances of secondary explosion. Consult the proper authority to determine proper method of venting. **Dust collectors do not contain Explosion Relief Vents, except on special order.**

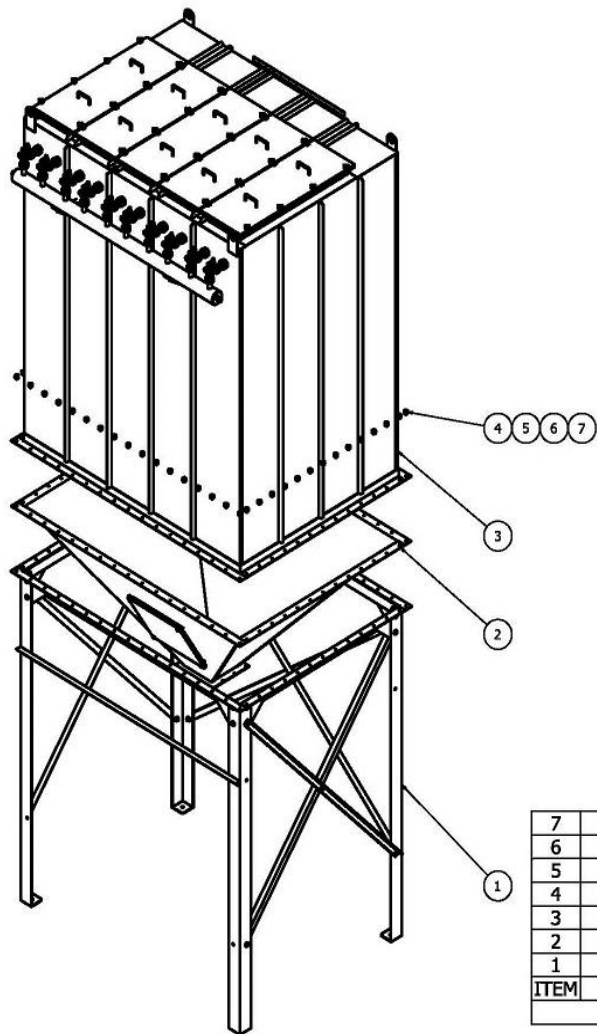
ASSEMBLY OF UNIT (See Page 4)

1. Determine the location where the unit is to be installed. Be sure to allow sufficient room to access the unit for servicing and maintenance on all sides. Ensure that the location selected is on a solid base (i.e. concrete pad) to allow anchoring of the legs.
2. Start by assembling the stand, using the ½ inch bolts, lock washer and nuts. Bolt on each of the legs to the frame. The two lower bolts at each corner will be used to attach the braces as well to the legs. Attach all the braces as shown. Anchor the legs to the base (i.e. concrete pad).
3. **IMPORTANT:** Make sure the collector stand is installed and secured perfectly level in each axis. Failing to do so will result in access doors being out of alignment, filters twisted in the housing, and other damage may occur to the collector.
4. Lift the hopper(s) onto the stand.
5. Apply sealant to the mating flanges of the hopper(s) and cabinet. Lift the cabinet into place using a safe and secure method. Enlist the services of a contractor who is specialized in such matters or severe damage may result from any other lifting method.
6. Before setting the cabinet in place, line up all the bolt holes of the hopper, stand and cabinet. Use the ¼" inch bolts & nuts supplied. Put a bolt through four diagonally opposite corners to prevent shifting and misalignment of bolt-holes when you drop the cabinet down. Drop the cabinet down gently onto the stand, ensuring the bolt holes don't go out of alignment. Fasten the rest of the ¼" bolts around the cabinet.
7. **The bottom of the hopper or dust drawer must be sealed from any leakage** by means of a slide gate, rotary air-lock, hermetically sealed drum lid kit or closing the drawer air-tight.
8. It is strongly recommended to install "an eccentric round to rectangle reducer", as shown in Figure 2. This assists the drop-out section at the inlet to function properly.
9. **IMPORTANT:** A control damper should be installed on the outlet of the blower. Using this damper and the method outlined in various publications such as Industrial Ventilation manual by ACGIH, Chapter 9; start up the collector and **measure the actual airflow** when the entire dust collection system is completely installed. Many jobs are overestimated for static pressure drop and will have significant operational problems if too much flow goes through the collector. Plasma and laser cutting are examples of a system failing within minutes with too much flow. Alternatively, a Variable Frequency Drive can be used on the blower (fan) motor to adjust the flow through the system.

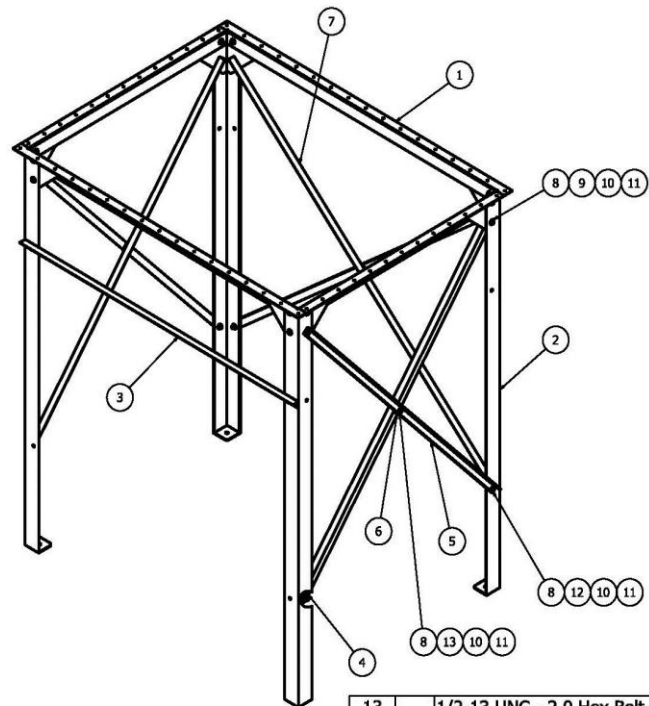
CAUTION

**THE UNIT IS NOT DESIGNED TO BE OPERATED WHILE
HANGING FROM LIFTING BRACKETS. UNIT MUST BE
MOUNTED ON LEGS AND CROSS BRACING INSTALLED.**

GENERAL COLLECTOR ASSEMBLY



7	3/8-16 UNC Hex Nut
6	3/8 Lock Washers
5	3/8-16 UNC - 1.25 Hex Bolt
4	3/8 Washer
3	CABINET ASSEMBLY
2	HOPPER ASSEMBLY
1	STAND ASSEMBLY
ITEM	DESCRIPTION
PARTS LIST	

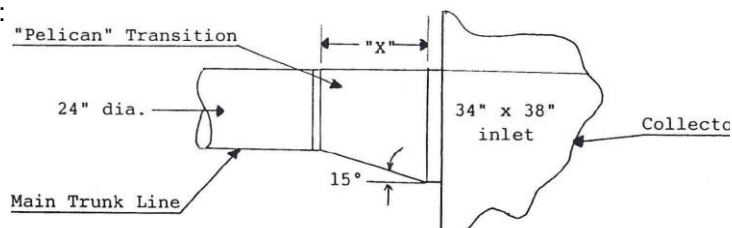


13	1/2-13 UNC - 2.0 Hex Bolt
12	1/2-13 UNC - 1.5 Hex Bolt
11	1/2-13 UNC Hex Nut
10	1/2 Lock Washer
9	1/2-13 UNC - 1.75 Hex Bolt
8	1/2 Washer
7	CROSS BRACE BACK
6	THICK SPACER (2 X 2 X .500)
5	CROSS BRACE SIDE
4	THIN SPACER (2 X 2 X .250)
3	CROSS BRACE FRONT
2	LEG ASSEMBLY
1	TOP FRAME ASSEMBLY
ITEM	DESCRIPTION
PARTS LIST	

RECOMMENDED DUST COLLECTOR INLET TRANSITIONS

One of the keys to a successful and efficient dust collection system is the use of a properly sized inlet transition. This piece of duct work connects the main trunk line to the inlet of the dust collector. When a properly sized transition is used, the velocity inside the trunk line duct is reduced enough such that the bulk of the dust in the airstream drops out without first collecting on the bags. This allows for longer bag life, a lower pressure drop and generally a more efficient filtering system.

The proper inlet transition to use is sometimes referred to as a "pelican" transition. It is a round-to-rectangle transition with the top side of the duct straight and the bottom side at a 15° slope downward. This type of transition allows sufficient time for the air to slow down as it enters the dust collector. Below is an example of how to determine the proper length of this transition piece:

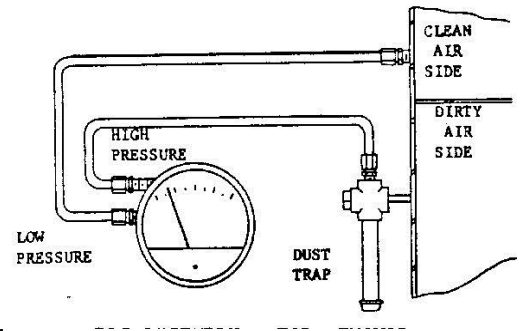


To calculate dimension "X" (the length of the transition), a simple rule is to take the vertical length of the inlet (in this case it is 38"), subtract it from the diameter of the duct work leading up to the inlet, and multiply by 4. For example: $38 - 24 = 14 \times 4 = 56$. Therefore, the length of the above transition is 56 inches long. There are other types of transitions such as those having two sloped sides. These do not perform as well as the "pelican" type since the length of the transition piece is usually half the size of the "pelican" style which does not allow for enough distance to sufficiently slow the air down. By using the correct inlet transition, you will ensure that your installation will be both efficient and effective.

DIFFERENTIAL PRESSURE GAUGE INSTALLATION

Because of the powerful pulse-jet cleaning system, it is essential to install a dust trap as shown here.

1. The dust trap is factory installed.
2. Provisions for line attachment have been made on the collector. The dust trap is mounted as shown. Ensure that the direction of flow arrow on top of the dust trap is pointing away from the dust collector connection.
3. Mount the magnehelic gauge in a convenient location for reading that is free from excessive vibration (or find it as part of the control panel).
4. For the Dwyer model 2010D magnehelic gauge, connect the vinyl tubing as shown; the + port on the gauge is the high pressure.
5. **Important;** zero the gauge before starting the collector. After starting the collector, if the reading is zero or negative, reverse the plastic tubing connections.



Important Maintenance: Periodically, the dust trap and the little white filter in the trap must be cleaned out. You should also detach and blow out the pneumatic tubing connecting the trap and the fittings at the dust collector housing. Make sure that the gauge ports are clean (be careful applying pressure not to damage the gauge). "Zero" the gauge.



False Pressure drop Measurement

The most common pressure drop measurement is the one across the filter elements. Many times this measurement is reliable and accurate. However, there are many factors that affect this measurement. The manometers or meters are usually located at ground level with tubing connected to the gauge. There are several factors that will make this measurement inaccurate.

The most likely measurement is that the **pressure drop will read high.**

Moisture condensing in the tubes

Dust being injected into the tube on the dirty air side because of the variation in pressure drop during the cleaning cycle.

Dust accumulating in the mechanism of the gauges.

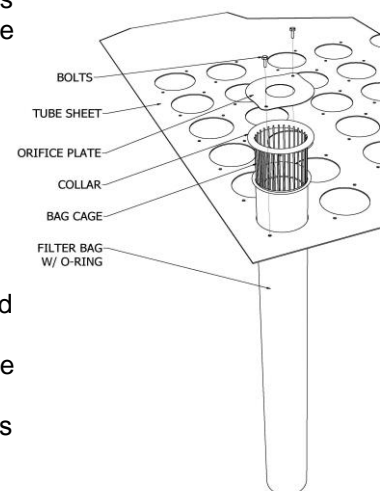
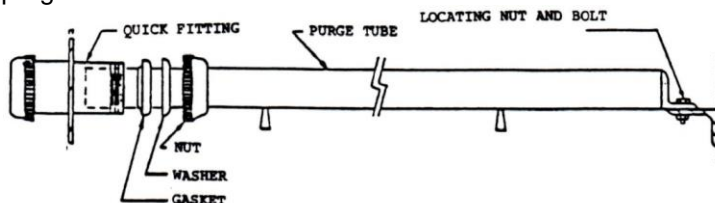
(1) Moisture condensing in the tubes is common when the collector is located outdoors. The tubes act like a heat exchanger and the air can be cooled below the dew point and water collects in the tubes. When manometers measure the pressure drop the water can be seen accumulating. It is difficult to get an accurate reading. In gauges, the water may not be as visible but the effect is still there. Often, even in outdoor systems where the dew point inside and outside the plant are nearly equal gauges can read accurately for years, then act up.

(2) Accumulating dust in the tubing and gauges is especially noticeable with dense dust. The small amount of dust that enters the tubes cannot be blown back out. Filters on the pressure tap lines may clog quickly, but inertial dust traps are a good choice since they are much more effective on high density dusts. These are available mounted on the collectors with some dust collector suppliers.

(3) It is best to install manual valves in the tubing lines so the lines can be blown clean periodically. The frequency of cleaning the lines depends on the conditions of humidity and type of dust.

BAG ASSEMBLY – TOP REMOVAL

Remove top covers. Handle carefully, so as not to damage the sealing surfaces. Remove the purge tubes by loosening the compression fitting on the diaphragm valve and slacking off the bolt at the other end of the purge tube. The quick fit nut should be backed off of the threads completely so that the gasket, washer, and nut can stay with the tube. Slack off the bolt at the other end of the purge tube.



Place the cage into the bag. Make sure the round gasket sewn in the top of the bag is tucked into the J-style flange of the cage top.

Place the bag and cage through the tube sheet hole. Be careful not to rip the bag on the tube sheet.

Place the orifice plate over the cage flange and tighten down with the 1/4" bolts into the rivnuts on the tube sheet. Do not over tighten as to warp the orifice plate.

The orifice plate is very important; it not only holds the bag/cage assembly in place but it also is a key to the proper functioning of the cleaning system.

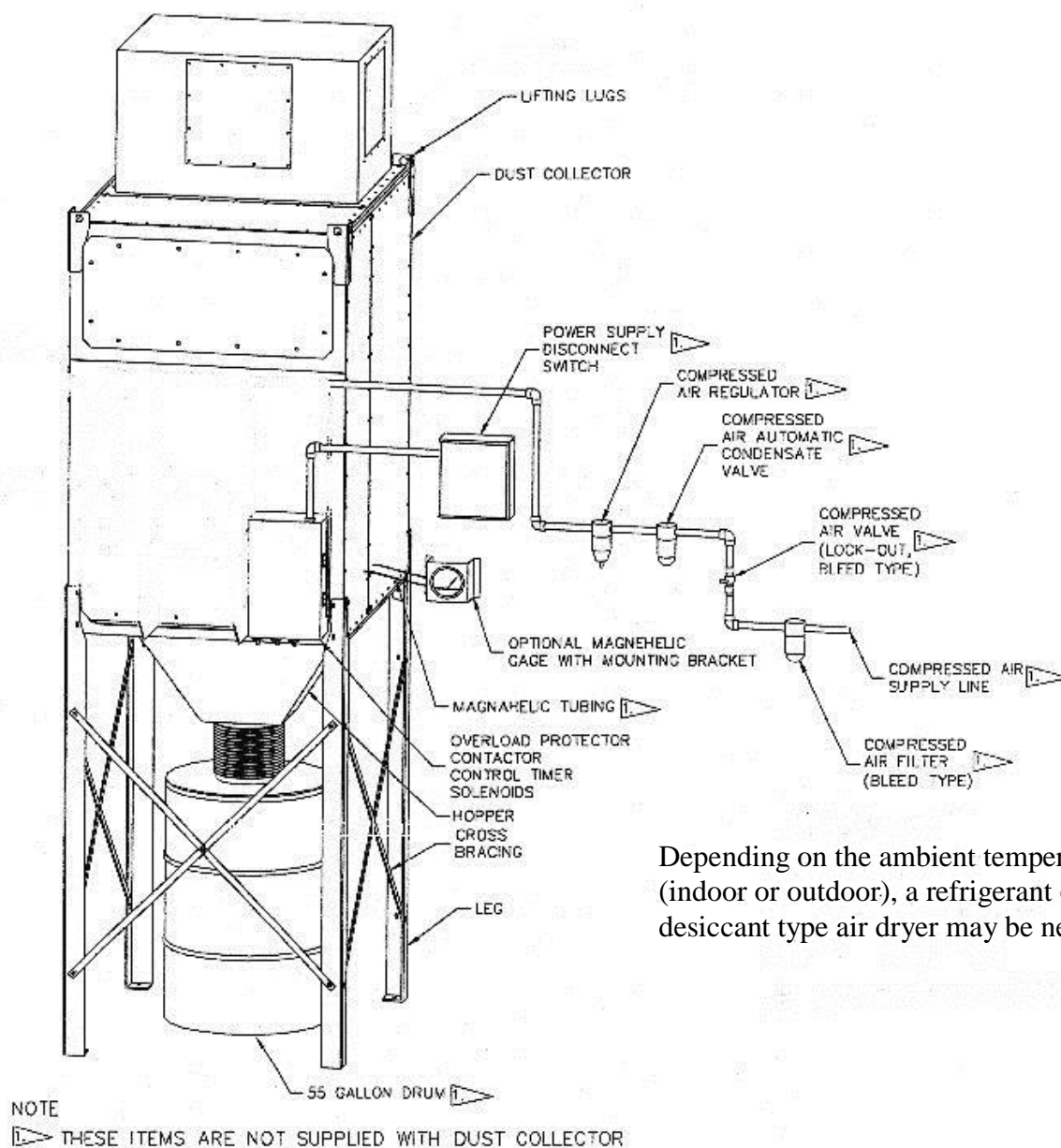
COMPRESSED AIR INSTALLATION

The compressed air inlet for the Ultra-Flow cleaning system is at each end of the valve manifold. There is a connection on both ends of the manifold, extending to outside of the collector cabinet and capped. Use whichever one is most convenient, but not both. The other is used for cleanout purposes. Minimum line size is stated on page 2. Plant air, at a pressure of 85-95 psig, is required for proper operation of the reverse-jet cleaning system. A field-installed regulator protects the system from over pressure which will damage filters and other components.

NOTE

Clean, dry, compressed air at the correct pressure is required for the cleaning system to operate correctly. It is recommended that a pressure regulator, air dryer and coalescing filter be installed between the compressed air source and the inlet to the dust collector.

Typical compressed air components are shown below.



Depending on the ambient temperature (indoor or outdoor), a refrigerant or desiccant type air dryer may be needed.

ELECTRICAL INSTALLATION

ALL ELECTRICAL WORK MUST BE DONE BY A QUALIFIED ELECTRICIAN

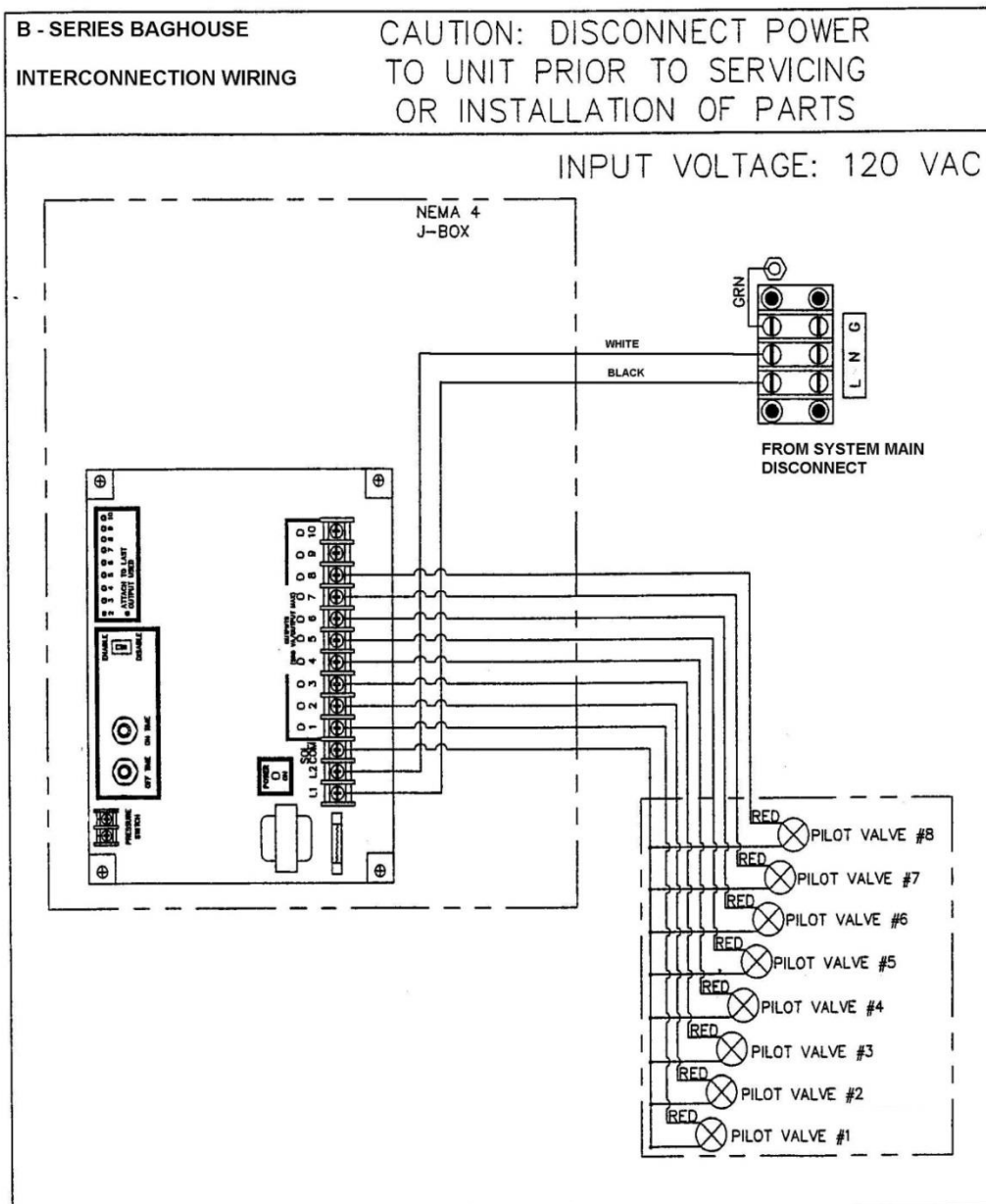
CAUTION

INSTALLATION CAN CAUSE EXPOSURE TO LIVE COMPONENTS. DISCONNECT ELECTRICAL POWER BEFORE PROCEEDING WITH INSTALLATION. PROPER LOCK OUT/TAG OUT PROCEDURES SHOULD BE USED.

1. Connect the blower to a field supplied starter/disconnect. Check for proper blower rotation.
2. Momentarily turn unit on and off via the remote start/stop switch. Note the rotation of the blower wheel. Ensure the rotation is in the proper direction.
3. It is strongly recommended to measure motor current during initial start-up. This procedure will insure that motor is not being overloaded due to inappropriate blower RPM or overestimated static-pressure of the total system.

When Automatic Cleaning Is Ordered:

4. The pulse control panel is mounted on the dust collector. It requires a 120 VAC supply. The standard control panel is a NEMA 4 enclosure but other enclosures are available for specific environments.
5. Open the pulse control box cover and make the connections according to the wiring diagram, which applies to your installation. Refer to wiring diagrams for proper controller board settings. Close the panel.
6. Timer board outputs to the solenoids for the diaphragm valves are factory wired.



UNIT OPERATION

Very important: (1) On initial start-up, record the pressure drop indicated by the black needle on the differential pressure gauge, or, indicated on the digital readout on the timer-controller. Store the initial pressure reading in a safe place (i.e. in the control panel with other important documents). (2) to build a stable filter cake; on initial startup, start the fan but lock out the pulse controller. Run the system until a pressure drop of 2"WC above the initial pressure reading is attained, then activate the cleaning system.

Automatic Cleaning:

1. Close the disconnect switch and/or turn the blower on by actuating the "Start" button. This action will cause the filter unit to activate and start cleaning filters. Timer actuated systems will start pulsing upon a signal from the timer. Pressure switch systems will only activate when a pre-set pressure drop across the filters is attained.
2. Adjust the cleaning frequency as instructed in the "Setting Cleaning Frequency" section of this manual.
3. ULTRA-FLOW has the most advanced cleaning system design of any dust collector. **This unit cleans entirely ON-LINE, while in the filtering mode. It allows for 24 hour operation.**

The contaminated air enters at the dust collector's large high inlet which leads to the drop out section. The air then makes a 90° turn and enters the bag filter section, causing most of the heavier dust to drop directly to the hopper. This drop out section also absorbs intermittent bursts of heavy high density loading. The air is pulled through the filter section in a downward movement, propelling the dust toward the hopper, avoiding the adverse effects of upward "can" velocity. The air then gets filtered through the bags and exits at the top of the collector. VS-series dust collectors have a perforated baffle separating the drop out section from the filter section. This baffle protects the filters and collector from abrasion. It also knocks out large chips, shavings and stringy debris.

NOTE: *Some particulate may pass through the filters and blower upon initial start-up.* This will end once the filters have been seasoned and a powder cake has formed on the filter. If this condition continues to occur, refer to the section "Setting Cleaning Frequency" to adjust the period of time between pulses.

TIMER-CONTROLLER BOARD SET-UP

Two set-ups are possible; "Continuous" timer control and, "On-demand" pressure switch control. This procedure is for 60VS-8 (10 valves), as an example, but the procedure is similar for all models by applying the specific number of valves.

CONTINUOUS Timer Control (series DCT500A or series DCT600):

1. **This is the most common set-up.**
2. Make sure there is a jumper between the high limit input and the common connection at the TB2 input terminal.
3. Set TIME ON (blue pot) to 100-120 milliseconds. **Do not change or exceed this setting, otherwise you could cause system damage and ineffective cleaning.**
4. Set TIME OFF (blue pot) to the desired cleaning cycle time. A good starting point is 7 minutes for one full cycle. Example; to set 10 valves for 7 minutes (420 seconds) cleaning cycle, Off time setting is 420 seconds divide by 10 valves = 42 seconds.
5. A jumper connector (to the side at the right of the blue pots) is provided to select the last channel used. Place the jumper on the two pins corresponding to the last channel used in the installation.
6. Connect the line power to L1 and L2. 120 VAC is required.

ON-DEMAND Pressure Switch Control:

1. These control panels (series DCT1000) are provided with a DCP100A pressure module.
2. Follow the instructions provided with the controller to program the DCT1000 Master Controller. We suggest the following settings;
 - a. The "LAST OUTPUT" is set to the number of valves being pulsed (10 in this case).
 - b. "TIME OFF" is set to 10-20 seconds. Start with 20 seconds then reduce as needed. Do not set less than 10 seconds.
 - c. "TIME ON" is set to 100-120 milliseconds. **Do not change or exceed this setting, otherwise you could cause system damage and ineffective cleaning.**
3. Set HIGH LIMIT and LOW LIMIT as instructed in the section "Setting Cleaning Frequency".
4. "High alarm"=5.0, "low alarm"=1.5, "cycle delay"=0, "down time cycles"=1, "auto alarm reset"=5
5. Connect the line power to L1 and L2. 120 VAC is required.

SETTING CLEANING FREQUENCY

Critical adjustment: Do not over clean the filter bags. Set the cleaning frequency to operate around 2 inches WC pressure drop across the filters. These collectors are so efficient that it is not unusual to see the pressure drop at 1.5"WC or lower. At those low operating pressures, you risk blowing off the thin filter cake needed for maximum filtration efficiency.

There are two ways of controlling the cleaning system:

- I. A continuous timer control without pressure control (offered as standard on V-series dust collectors).
- II. An on-demand differential pressure switch (offered as an option on V series dust collectors)

Cleaning frequency is influenced by the type of dust and its density. OFF TIME will vary depending on the dust load being introduced to the media.

- I. With a **Timer board** Controller, set the cleaning cycle as follows:
 1. Determine the pressure drop with the filter bags clean and rated flow in the collector.
 2. Set the electronic timer to clean the entire collector every seven minutes (or as indicated on page 8). See "Timer-Controller Board Set-up".
 3. After 2-3 days operation, lengthen the cleaning time by 10%. Repeat this until the pressure drop rises, then return to the previous setting.

- II. With an **On-Demand Pressure Module** Controller:

This method ensures a stable and proper filter cake formation on the filter media. It also has the advantage of cleaning only when needed. **NOTE: There are some applications where the pressure switch control is not recommended. Consult the factory on these.**

The pressure module measures the pressure differential between the dirty air side of the filters and the clean air side. The cleaning system will not activate unless the differential pressure across the filters reaches the HIGH LIMIT setting. Then the cleaning system will run until the LOW LIMIT setting is reached, and it will shut off.

It is set as follows:

1. Determine the pressure drop with the filters clean and rated flow in the collector. Read it on the LCD display.
2. Set the "LOW LIMIT" to 1" WC over the initial clean filter reading. This may vary with some dusts and would have to be set by trial and error. Consult QAM Engineering for assistance.
3. Set the "HIGH LIMIT" to 2" WC. above the LOW LIMIT set point.
4. After operating the collector for some time, if the cleaning does not shut off anymore, increase the LOW LIMIT set point by another 1/4" WC and also increase the HIGH LIMIT by the same amount.

NOTE: There are some applications where the pressure switch control is not recommended. Consult the factory on these.

OFF-LINE CLEANING

With ULTRA-FLOW, Off-Line cleaning is needed only to thoroughly clean filters in the case of an unexpected breakdown, causing the filters to load up heavily and bridge across the bags or the pleats of pleated bags.

1. Determine the cause of the breakdown and repair it.
2. Shut off the system blower (fan) while maintaining power to the timer controller.
3. Clean the collector for 3-5 cycles;
 - a. AUTOMATIC CLEANING;
 - i. Maintain power to the controller on the dust collector.
 - ii. Allow the collector to pulse.
 - b. ON-DEMAND CLEANING
 - i. Shut off power to the controller on the dust collector.
 - ii. On the DCT1000 series controller, the "manual override" function allows the system to be set to the run mode regardless of other conditions. This mode is enabled when the manual override terminal and common are connected. It is disabled when they are disconnected. If the controller is to be run in continuous mode, a jumper wire may be wired across these terminals.
 - iii. Restore power to the controller but not to the blower (fan).
 - iv. Allow the collector to pulse.
 - v. Shut off power to the controller and remove the "manual override" jumper wire.
4. Re-start the blower (fan) and controller.
5. Check the pressure reading. If the pressure is below 2" WC, let the collector run normally. If the pressure has come down but is still too high, repeat steps 2 to 4 until the desired pressure reading is attained.
6. If the filters are so badly clogged that the pressure refuses to come down, it will be necessary to remove and clean them manually or replace them.

Check the following items in sequence:

1. Check electrical supply and connections per wiring diagram.
2. Inspect ductwork and gates for proper positions.
3. Check bags and cages for proper assembly.
4. Check housing joints assembly and foundation anchors.
5. See if compressed air supply is regulated to 85-100 psig at the manifold.
6. Activate the timer. Check sequence of valve operation.
7. Check for air pressure recovery between pulses at the manifold. (85 psig)
8. Check for air pressure drop at the manifold, during the pulses. Not to drop below 45 psig.
9. Close all access doors. Check for seal integrity.
10. Check discharge configuration for seal integrity. (conveyor/airlock)
11. Adjust filtering air fan damper to approximately 3/4 open.
12. Activate the filtering air fan, without introducing the dust load.
13. Record the start-up differential pressure gauge reading, before introducing the dust load.
14. Introduce the dust load. When the differential pressure gauge indicates a change, sufficient "cake" will have accumulated to resist media blinding. Readjust the fan damper to design specifications.
15. Monitor the differential pressure gauge readings. Adjust timer settings as required. See operating instructions.

NOTE: Troubleshooting begins with a review of the recorded differential pressure gauge readings. It is important that clean-start values be recorded as well as the operating data!

MAINTENANCE

Once properly adjusted, the collector requires little maintenance. The units should be inspected at 3 month intervals as follows:

- Note the differential pressure gauge reading and add to your record. Severe applications may require more frequent checks. (Weekly or Daily)
- Check the cleaning air supply for cleanliness and moisture.
- Note the operating air pressure gauge readings at the manifold. Must recover to 85 psig between pulses.
- Check the air valves for sequential operation.
- Check the door and cover seals for leaks.
- Refer to Assembly and Start Up Sections for filter replacement.
- Refer to the fan manufacturer's IOM manual for properly operating and maintaining that component

TROUBLESHOOTING

Problems with the collector usually appear soon after installation: often the result of improper assembly or operating techniques. Adhering to the instruction materials in this manual will pay dividends in trouble free operation and extend service intervals.

The collector has been sized for specific conditions, such as moisture and dust characteristics. Occasionally deviations from the original design parameters will be introduced. In some instances, the new conditions can be compensated for by substituting special media. This should only be considered after a thorough analysis of the problem has been made.

Troubleshooting should begin with a review of the start-up checklist. Normally, the cause of the problem will be within the scope of that list.

The following list is provided as a supplement to the start-up checklist. It covers a wider range of symptoms and their causes.

<u>SYMPTOM</u>	<u>CAUSE</u>	<u>ACTION</u>
Fan stopped	Overload Switch	Electrical supply/rating Drive sheaves reversed improperly adjusted sheaves improperly adjusted dampers System differential pressure low Discharge equipment failure.
Poor hood control	Fan Malfunction	Sheaves reversed Belts slipping Defective fan wheels Incorrect sizing – fan
	Duct System	Incorrect sizing - ducts
	Pressure diff. high	See excessive pressure diff.
Excessive pressure Differential	Cleaning System	Gauge lines plugged Insufficient cleaning air Timer-fuse Valve malfunction Solenoid malfunction
	Plugged Media	Free moisture in air stream Liquid hydrocarbons Overloading Hygroscopic dust Hopper bridging Cleaning system malfunction

Trouble Shooting Pulse Jet Dust Collector Problems

Section 1 Compressed air pressure

Most pulse jet collectors are designed to run and clean at 85 PSIG. If the pressure at the header is reduced the filtering capacity of the collector is reduced. On a typical contemporary fabric collector design with a 1 5/8 inch throat bell-mouth & evasé (also referred to as a venturi), the capacity varies with compressed air pressure as shown in table 4-1.

TABLE 4-1

Air pressure	Capacity	Filter ratio with 10 sq. ft. bags
85 psig	100%	6-7
75 psig	85%	5-6
60 psig	60%	4-5

Because of throat velocity considerations, it is not recommended that the air pressure be increased to increase capacity in most fabric collectors. On many pleated media (cartridge) collectors, the dynamic forces from the jet pressure exerted on the bottom (closed end cap) of the filter may place higher stresses on the adhesive joints.

Section 2: High Pressure drop and high air consumption for baghouses with fabric filter elements.

These common complaints are usually associated with each other. The cause of these complaints is usually a result of low permeability cake or dust entering the clean air side of the filter elements.

The first procedure is to clean the collectors without flow through the filter elements (off-line) as follows:

- A. Stop the fan and let the cleaning system run. Pulse through one cycle and re-start flow through the filters. Measure the pressure drop before and after the cleaning cycle. This measurement should be recorded immediately. If the pressure drop lowers by more than 2 inches of water column (WC), the most likely problem is that the finer dust cannot fall into the hopper because of the upward “can” velocity component of the dirty air entering into the filter element section of the collector. The obvious recommendation is to occasionally shut down the flow (fan, keep pulsing on) in the collector briefly, to purge the fine dust. Often this problem results in fine dust loading on the filter elements until the pressure drop rises high enough to slow down the vertical velocity to the level where the dust falls into the hopper in a big “slug” and may bridge the airlock opening. This is especially evident when collecting dust with low densities. The decrease in permeability is due to the fine dust accumulating in the filter cake (see lesson 11).
- B. Pulse the collector through up to twenty cleaning cycles, off line. Then measure the pressure drop at intervals of 3-5 cycles. If the pressure drop falls to within one inch of the initial pressure drop (measured at initial startup with pristine filters) this indicates that the media is not plugged and there is no dust leaking to the clean side of the filter element.
- C. If the pressure drop does not fall to the predicted levels outlined in (A) or (B), the causes of the higher pressure drop levels are very likely to be dust entering to the clean air side. For a fabric cylindrical bag, the test is easy. The bag is carefully removed from the collector and the finger snapped on the dirty side while the inside is observed. If a puff of dust is observed at the impact point, the penetration of the dust through the media can be verified. As described in lesson 2 & 3, the high velocity dust propelled from adjoining bags during cleaning is the likely culprit.

The options are as follows:

- a. Change bags frequently.
- b. Modify and retrofit the cleaning system to lower the throat velocities in the cleaning system.
- c. Install bags with PTFE laminated construction or other constructions to resist the velocity of the dust striking the filter cake surface.

Section 3; High Pressure drop and high compressed air consumption with Cartridge (pleated) filter elements

Review lesson 4 – Cartridge collectors, for more details.

Since the pleated filter elements eliminate the problems caused by the high velocity of the dust ejected from adjoining filter elements, the remedies outlined in (C) can be eliminated from consideration. Most pleated element collectors do not use inlets in the hoppers so vertical “can” velocity components towards the filter elements are seldom an issue as described in (A).

The causes of the high pressure operation are usually leaking from the dirty side to the clean side for one or more of the following reasons:

- D. Resiliency of Seals (Gaskets); many leaks occur at the joint between the top open end of the cartridge and the dust wall (tube sheet). In order to maintain a dust tight seal, pressure must be maintained on the mating surfaces. The first test to be performed is to put the cartridge face down on a smooth clean surface and to place weights of about 5 pounds per lineal inch of seal on the opposite end of the cartridge. This will squeeze the seal by more than 50%. After 8-10 hour remove weights and examine height of the seal. It should return to the original thickness within two or three minutes. If it stays flattened the cartridge should be rejected as this is probably the cause of the symptoms described at the beginning of this section.
- E. Seal alignment; sometimes, especially in horizontal mount housings with bolted construction, the tolerances in assembly are such that the cartridges are incorrectly lined up and the seals are not flat. One side of the seal may actually not be in contact with the dust wall (tube sheet). This can be checked by putting four to six pieces $\frac{1}{2} \times \frac{1}{2}$ inch of resilient putty (Silly Putty TM) as high as the seals, spaced around the periphery of the seal. Install cartridge and then remove. Examine to see if there is even deflection on all of the pieces of putty. If the deflection is insufficient, it may be necessary to align housing or install larger gaskets of the resilient type.
- F. Uneven Cleaning; to maintain an effective filter cake, the cleaning velocity of the jet must be constant from top to bottom of the filter. This requires that the target of the cleaning jet, as it strikes the closed end of the filter element, must be perpendicular to the jet. Otherwise the cake may be damaged and dust leakage will occur after each cleaning cycle until the damaged filter cake re-establishes its efficiency. There are proprietary designs which have flat plates installed over the top of cone bottoms where these cones are integrated into the mounting systems. Most new designs have flat bottoms on the closed ends of the single or tandem cartridge mounting mechanisms.
- G. Improper Pleat Spacing; see lesson 4, if the dust bridges across the pleats on the dirty side, any media below the height of the bridging will not be cleaned. The air flowing from the jet through the media will always take the path of least resistance. It will flow above the bridge of dust in the pleats. Sometimes the cleaning sequence is not initiated, by pressure switch, until the pressure drop across the filter element reaches a preset level. Typically 80 to 90% of the media is bridged, so the effective filter area is that which is left higher than the bridge(s). That is the drawback of using a pressure switch (on-demand cleaning). Also the particular volume of a cleaning jet will clean a certain area of media. If the filter ratio is too low only a fraction of the media can be cleaned with the available reverse air volume. This can be remedied by one or both of the following:
 - 1) If used, start the pressure switch at a setting $1/2$ inch above the initial pressure drop (measured at initial startup with pristine filters) and gradually increase the setting until the cleaning cycle stops and starts. This will be the proper value for minimum cleaning and optimum pressure drop operation to give longest cartridge life with minimum dust bridging.
 - 2) Select cartridges with wider pleat spacing (advanced technology). For cellulose filter media the recommended pleat spacing is 8-10 pleats per inch based on ID of the cartridge. Pressure switch setting outlined in (1) should also be set at the controller.
- H. Joints; There are three joints in a pleated filter element that are critical.
 - 3) The adhesive joint between the top cap and the filter media is most critical. The adhesive must have uniform depth and be cured completely. If the cure is too hot there will be bubbles visible in the creases in the pleats. The adhesive must completely wet the filter media. This can also be checked when looking into the pleats at the joint.

- 4) The bottom end cap joint and the filter media joint are different. The curing time is longer so it is more susceptible to incomplete curing. An awl inserted on the surface of the adhesive will determine if it is hard (completely cured) or soft (incompletely cured).
- 5) The other joint is that where the pleats overlap or are joined. There are several variations, all of which are effective; a metal U joint, tape, hot melt and overlapping pleats are common. To inspect the joints, blow off as much dust as possible, then go into a dark room and insert an extension cord with an attached lamp into the open end and inspect the joint. Poor joints will be visible through the translucent cellulose media.

Section 4 Control Functions

The cleaning function occurs in the first few milliseconds after the diaphragm of the control valve actuates.

- I. The cleaning control should be set to the minimum pulse duration in which the valve opens. The sound should not have a hissing sound. With prolonged pulse duration, compressed air is wasted and moisture condensation in the jet is enhanced. (see section 5)

Section 5 Jet Temperatures

When compressed air expands, it cools. The temperature of the compressed air cools to lower than -10°F . The induced air mixes with the expanded and cooled compressed air so that the net result is that the mixture jet temperature is $4\text{-}5^{\circ}\text{F}$ cooler than process temperature. If the resultant temperature is below the dew point of the process air, condensation will occur on the filter media.

- J. This jet temperature can be heated above process temperature by heating the air in the dust collector valve manifold. These thermostatically controlled heaters are available from Quality Air Management.

Conclusions:

Most common problems with Pulse jet collectors can be analyzed and remedied easily.

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Limited Warranty

Series B and LC baghouse dust collectors, when purchased and installed for industrial use, is warranted by Quality Air Management (QAM) to the purchaser for one (1) year against defects in material or workmanship of the product. Any defective part in the product will be, at QAM's option, either repaired or replaced. The purchaser must obtain a Returned Goods Authorization and return such defective part, with all transportation charges prepaid by said purchaser to a location specified by QAM's Customer Service Department. Any other returns will be refused and sent back to the sender. The repaired or replacement part will, in turn, be shipped by QAM, to the purchaser, freight collect, with the purchaser to be responsible for all freight charges. The warranty on any repaired or replacement part shall be for duration of time no longer than the remaining or unexpired term of the original warranty. This warranty does not cover any labor or other service charges incurred by the purchaser.

Warranty coverage begins on the ship date (or 30 days from ship date if the sales contract provides for QAM installation), or on the date of sale to the end-user customer if is sold by a distributor or value-added reseller.

Replacement Part Coverage

Any replacement part that is defective will be repaired or replaced for a period of up to 90 days, excluding "wear" and "consumable" parts, or for the remainder of the coverage for the original machine warranty, whichever is longer.

Distributor Warranty

For a product(s) sold by QAM to a purchaser on a buy and resale basis, any warranty claims will be subrogated back to the manufacturer/supplier and be governed solely by said supplier's warranty, terms and conditions.

Performance Guarantee

The dust collector will collect dry particulate from a vented dry gas at the rated flow in cubic feet per minute and temperature not to exceed 200°F. **Pressure drop will not exceed 4 inches WC** across filter elements. **Dust penetration will not exceed 0.002 grains per cubic foot** converted to standard conditions of 70 degrees F and 14.7 psia., when dust loading, at the inlet, is not to exceed 10 grains per cubic foot. The performance will **meet OSHA, Ministry of Labor, EPA and Department of the Environment standards** now and in the future.

Disclaimers and Exclusions

Following shall be applicable to products of QAM, described above which are purchased for an industrial use.

- Customer/purchaser waives any rights under, and seller shall have no obligations under this warranty if any portion of the purchase price remains unpaid or if customer's account with seller is in arrears.**
- The warranty described hereinabove shall be IN LIEU of any other warranties, whether statutory, oral, expressed or implied. Except as set out hereinabove, there are NO other warranties, and, any statutory or implied warranty of MERCHANTABILITY or fitness for a particular purpose is EXCLUDED from this transaction and shall not apply.
- Complete jobsite and operating conditions must be provided, by the purchaser, either on our job survey forms or with the quote request or with the purchase order. Otherwise the performance guarantee and/or warranty shall be void.**
- The purchaser agrees that his sole and exclusive remedy against QAM, shall be for the repair or replacement of defective parts as provided hereinabove. The purchaser agrees that NO OTHER REMEDY (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property, or any other incidental or consequential loss) shall be available to him. The sole purpose of the stipulated exclusive remedy provided for herein, shall be to provide the purchaser with repair and replacement of defective parts in the manner provided for hereinabove. This exclusive remedy shall not be deemed to have failed of its essential purpose so long as QAM, is willing and able to repair or replace defective parts in the prescribed manner. The purchaser shall not be required to deliver a defective part to QAM, if: The part was destroyed as a result of its defect or any defect in any part covered in this warranty; and QAM, is reasonably satisfied that the part was defective at the time of sale. If both of these conditions are met, QAM will replace the part in the same manner provided herein as if the purchaser had delivered it to QAM.
- The purchaser acknowledges that no oral statements purporting to be warranties, representations, or guarantees of any kind about any product of QAM, have been made to purchaser by QAM, or its dealer, which in any way expands, alters or modifies the terms of the warranty set out herein. Any such statements do not constitute warranties, shall not be relied on by the purchaser, and are not part of the contract of sale. This writing constitutes a complete and exclusive statement of the terms of any warranty, express or implied, of QAM.
- There is NO WARRANTY for any defective part of a QAM product which has been removed from its original installation site or which arises from mishandling, neglect, fire, flood, lightning, corrosive atmosphere, improper installation of the product, unauthorized modification of the product, improper fuel or electrical supply to the product. There is NO WARRANTY for any defective part of a QAM product that arises from the failure of the purchaser to perform the normal and routine maintenance on the product as it is set out in the instruction booklet. There is NO WARRANTY for any defective part of a QAM product that arises from a change of application, or collected contaminant from that which was initially specified.
- CONSUMABLE PARTS; items such as, but not limited to, membranes, heater elements, fuses, bag filters, bag cages, pleated bag filters, cartridge filters, abrasive media, abrasive wear plates or baffles are not covered by this warranty.

8. The foregoing does not apply to components which were not manufactured by QAM or its licensees, for example valves, filter elements, timer controllers and product(s) sold as a distributor.
9. This warranty and all rights granted herein under shall be void and of no force or effect if consumable elements (i.e. filters) are replaced with elements that are not approved or supplied by QAM.
10. QAM is not responsible for, and will not pay for, work performed or repairs made by any other party unless prior written approval is obtained from QAM.
11. Warranty coverage does not include labor, freight, duty or taxes, whether sold domestically or outside Canada and USA.
12. QAM expressly limits its warranty responsibility or liability to the terms contained in the foregoing warranty provisions and in the Terms and Conditions Policy which are part of the sales agreement. QAM expressly disclaims any liability for any compensatory or consequential damages, foreseeable or otherwise, arising from or related to any product failure.

Warranty Claim Procedure

To initiate warranty service, contact the QAM customer service department or the distributor that sold the machine. Notice of any warranty claim for defective part must be received in writing within the warranty coverage time.

During the first year of the warranty, warranty parts weighing less than hundred 50 pounds or less than 108 inches in length will be shipped using standard UPS or FedEx ground service, or standard ground transportation if over the UPS size and weight restrictions. Parts requiring UPS expedited service, Federal Express or air freight will be shipped freight collect.

If a warranty determination cannot be made at the time replacement part is ordered or warranty claim is reported, the customer/purchaser must issue a purchase order and will be invoiced for the replacement part or warranty service. A Returned Goods Authorization (RGA) will be issued by QAM for the return of the original part. During the 90 day "no hassle" coverage, the part should be returned freight collect, after which all parts must be returned freight pre-paid. QAM will issue a credit memo when the original part is returned and found to be defective, provided it is received within 30 days of the original part shipment.

Parts returned without a Returned Goods Authorization (RGA) will not be accepted by QAM.

Limits of Liability

Except as expressly set forth herein, QAM shall not be bound by any representation, promise or inducement made by its agent or employee.

The remedies of the buyer set forth in this limited warranty policy are the buyer's exclusive remedies. The aggregate liability of QAM for any claim of any kind for any loss or damage resulting from, arising out of or connected with this agreement or from the performance or breach thereof, or from the manufacture, sale, delivery, resale, repair or use of any product(s), whether based on contract, tort (including negligence), strict liability, indemnity, or otherwise, shall in no event exceed the price allocable to the product which gave rise to the claim. In no event shall QAM be liable to the buyer or any other party for special, incidental or consequential damages of any nature, including but not limited to: loss of profits, revenue or business opportunity; loss by reason of shutdown of facilities; loss because of inability to operate any machinery or facility at full capacity; damage to materials processed using the product(s); and delamination of or defect in any product produced using the product(s). The provisions of this paragraph shall supersede any inconsistent provisions in any document involving the buyer's purchase of product(s) or forming a part of the purchase contract.

Customer assumes the sole responsibility of determining whether any particular QAM product or system is suitable for the customer's contemplated use, whether or not such use is known to QAM. Customer assumes all risks and liabilities arising from the operation, performance and use of any QAM product or system.

The customer's exclusive remedy for breach of any QAM warranty is repair or replacement of the defective QAM item, whichever QAM elects. In the event that a court determines that the sole remedies stated in and incorporated in the Terms and Conditions in any sales agreement between the parties have failed of their essential purpose, then buyer's exclusive remedy for breach of any QAM warranty shall be the return of the product(s) freight prepaid for refund of the purchase price less any depreciation/restocking charge of 2% per month or a minimum of 15% whichever is greater. Any refurbishing required to restore the product(s) back to resalable as new condition will be deducted from the refund.

Quality Air Management, div of O2 Environmental Technologies Inc., Cleveland, OH, USA, Tel: 1-800-267-5585