Controlled Air Design
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Installation & Service Manual for VCF Series Collectors

Models
VCF-1
VCF-2
VCF-4
VCF-6

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Table of Contents

Disclaimer

Although instructions and recommendations are included for installation of your **Vertical Cartridge Filtration System**, the manufacturer does not assume responsibility for the installation of this equipment nor shall he be held liable for direct or consequential damages resulting from improper installation, application, maintenance or use.

The immense variety of contaminants make it impossible to list all of the potential hazards that may be encountered with air pollution control systems. It is therefore important that the application of the equipment be discussed with an AER Control Systems representative or application engineer prior to use. Additionally, users should consult and comply with all National and Local Fire, Electrical and /or other appropriate codes when determining the application, location and operation of any air pollution control equipment.

Collection of combustible or explosive materials and collection on flame or spark-generating operations may require specific system configurations (contact AER Control Systems LLC. Applications Engineering Department for questions and/or design assistance). The combined collection of combustible or explosive materials and contaminants from spark or flame generating operations, with a common collector or duct system, is not recommended, unless special design provisions have been made to the system (sparks or flames resulting from such operations may ignite the combustible or explosive material). Under no circumstances should anyone be allowed to discard a lighted cigarette, other burning materials, or refuse into an inlet hood or the duct of the collection system. It is the responsibility of the end user to comply with all applicable national, state, and local fire and safety codes.

This manual should be read completely before attempting Operation or Maintenance of this equipment. All work should be performed by qualified personnel according to local requirements.

WARNING

Failure to comply fully with the following instructions and local code requirements may increase your risk of physical injury due to fire, explosion or electrical shock.

All data and dimensions in this manual have been thoroughly checked however, we cannot assume responsibility for possible errors or omissions. We reserve the right to change designs and/or specifications without notice.

SECTION 1

Uncrating

1. Remove banding and cardboard shipping carton and packing.

2. Floor stand, Hoppers, Plenum Boxes, and Attenuators are typically labeled and packed with the unit to be installed, Mounting hardware is included for mounting these items. Be sure to check all boxes for any miscellaneous parts or hardware items before discarding.

3. Inspect the exterior of the unit and accessories for shipping damage or shortages that may not have been noticed or recorded when the shipment was initially received; you have 30 days to notify AER Control Systems LLC. of any discrepancies. Contact the shipping company if any damage or shortages have occurred.

Description & Operation

The VCF Series Collectors consist of a vertically mounted filter module which houses the cartridge filters. Each cartridge has a filter media pack of 2 inch pleated media and is formed in the shape of a hollow cylinder. The interior of the cartridge cylinder is open to the pulse tank module, which periodically cleans the cartridges by compressed air, pulse jet flushing.Diaphragm valves are mounted to a compressed air reservoir tank and activated by a solenoid valve or manual push button control valve. During operation a short blast of compressed air to the interior of one bank of filters results in media vibration and airflow reversal that back flushes collected contaminants off of the exterior surface of the filter bank. By alternating the compressed air cleaning of the filter banks, the system can continue to collect contaminants while cleaning takes place. The motor/blower module is located on the clean air side of the system after the pulse tank module and provides airflow for the collection system.

Optional Equipment

Special Filters	Drum Kit	Hopper and stand
Motor Starters	Mechanical Arms	Smart Pulse w/ Downtime Pulse
Delay Pulse Timer	Casters	Inlet Plenum Boxes

SECTION 2

Applications - General

1. Dust & Fume - The **Vertical Cartridge Filtration System (VCF)** is designed for the capture and removal of **DRY** dust and/or fumes generated from sanding, grinding, welding and other industrial processes. The VCF cartridge collector is a modular system consisting of a filter media/cartridge filter module, collection trays and a final module containing the air reservoir tank and pulse-jet cleaning system, blower and motor. The unit can be arranged in a variety of configurations and can be equipped with specialized filters for application specific filtration requirements. The floor mounted collectors are designed primarily for direct ducted, source capture applications

2. Size - It is important that the proper size unit has been selected for the application. Too little airflow will not draw the contaminant into the filter and the unit will not be completely effective. Too much airflow may result in loss of efficiency or the unit will pick up large or heavy solid particles increasing the frequency of maintenance or filter replacement. Questions regarding proper unit sizing should be directed to your local AER Control Systems representative or the main office (toll free 866-265-2372)

3. Models - Model codes are utilized to identify the various unit configurations available. The model VCF (Vertical Cartridge Filtration) system uses a direct drive blower (sometimes called a plug fan) along with the number 750 and 1500. The 750 unit has a 1.5 HP direct drive motor and the 1500 unit has a 3HP direct drive motor and fan. The 750 has one cartridge filter and the 1500 is equipped with two cartridge filters.

4. Hopper and Drum Kits - Hopper and Drum kits are available on the Vertical Cartridge Filter units for applications that require greater dirt storage capacity.

5. Collars & Inlet Plenums - Ducted source capture units are provided with inlet collars and / or inlet plenum boxes for attaching ductwork or for direct mounting of mechanical arms.

6. Portable Units - The 750 and the 1500 is available with four casters for portability and an extraction arm can be added as an option.

SECTION 3

Installation

Assembly & Installation VCF-1, VCF-2, VCF-4, and VCF-6

Standard Collectors are pre-assembled for the VCF-1 with exception to optional items such as inlet plenum boxes, hopper/stand, and drum kits. The VCF-2 is assembled in two pieces. One piece is the cartridge cabinet and the other piece is the pulse tank/blower cabinet. The pulse tank/blower cabinet can be bolted to the top of the cartridge cabinet at the customer's facility. The VCF-4 and VCF-6 are usually supplied with a floor stand, hopper, and inlet plenum section. These three sections are shipped separately from the top VCF cartridge and blower section. Standard collectors are free standing and are typically located in a central location near to the operations needing collection. Weldnuts for permanent mounting (bolt to frame or hang with threaded rod) are welded in the corners of each module on the top of the cabinet. Eyebolts for lifting, assembly, and mounting are provided.

The VCF-4 and VCF-6 floor stand is shipped assembled with the hopper and inlet plenum set on top of the hopper and stand. The cartridge filter and blower cabinets will ship loose and can be mounted and bolted together in the field.

The integral junction box is factory wired for 460 volts 3 phase (unless otherwise specified on the purchase order) requiring only a qualified electrician to connect input power to the unit. Suitable overload protection such as a motor starter is required. Refer to the electrical section. (Combination motor starters with fusible disconnect packages are available through most local AER Control Systems LLC. distributors).

A connection for clean, dry, compressed air is located outside the pulse tank module and connected to the air reservoir tank. A 120-PSI relief valve to prevent tank over-pressurization and a condensate drain (check periodically) are provided and are pre-connected to the reservoir tank. The supply airline should be purged to remove any debris before connecting it to the unit to prevent damage to the pulse valves on the system. The supply compressed air line should be equipped with a manual shut-off valve, a filter/separator, air regulator, and a pressure gauge and located close to the VCF system. If the unit is to be installed in an area where freezing temperatures or high humidity are to be expected, an air dryer capable of drying the compressed air to below the dew point must also be provided. If excessive moisture is present, check drain frequently or install an automatic drain.

SECTION 3

Installation continued

All three-phase units are wired for the input voltage specified on the purchase order. Unless specified otherwise, standard units are wired for 460 volt, 3 phase, 60 Hz operation.

Motors used on the VCF collectors are UL recognized and internal wiring is UL rated at 600-volts. Input power line protection is required for the motor and electrical components. Line load and current requirements are identified on the motor nameplate. Unless ordered with the machine, the power switch for operating the machine, any fusible disconnect, motor starter or controller are to be provided by the customer/user and located externally to the machine.

After electrical hook up it is important to verify that the fan rotation is correct. Incorrect rotation results in much lower airflow and increased noise. For standard three phase installations, changing connections of any two of the three input power lines will usually reverse fan rotation. Rotation direction can be found on the side and/or back of the motor.

If it becomes necessary to change the input voltage, the wiring diagram on the motor and transformer nameplates show the appropriate wire connections - these diagrams are also shown below:

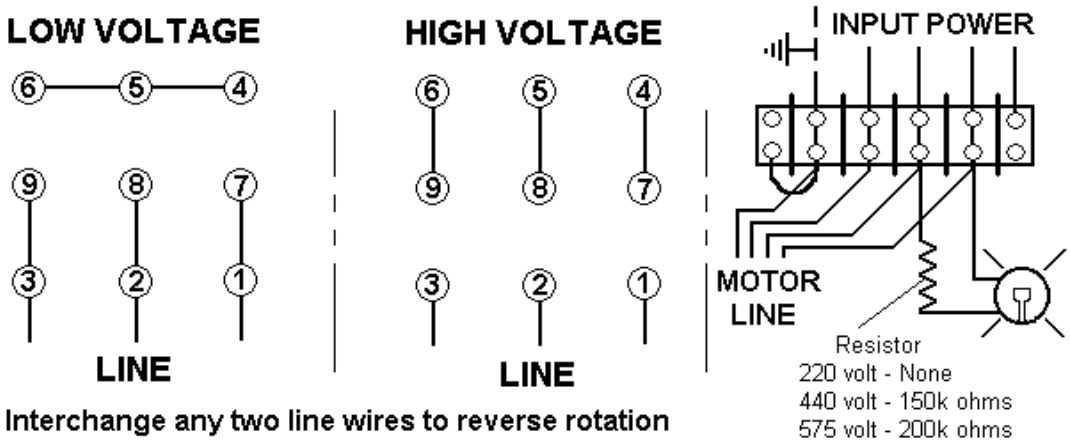

Figure 1 - Motor & Transformer Connection Diagram

NOTE

A motor starter with overload protection must be provided by the User. Thermal overload heaters are installed in the external motor starter. Consult the starter manufacturer for recommended heater size for the installed motor.

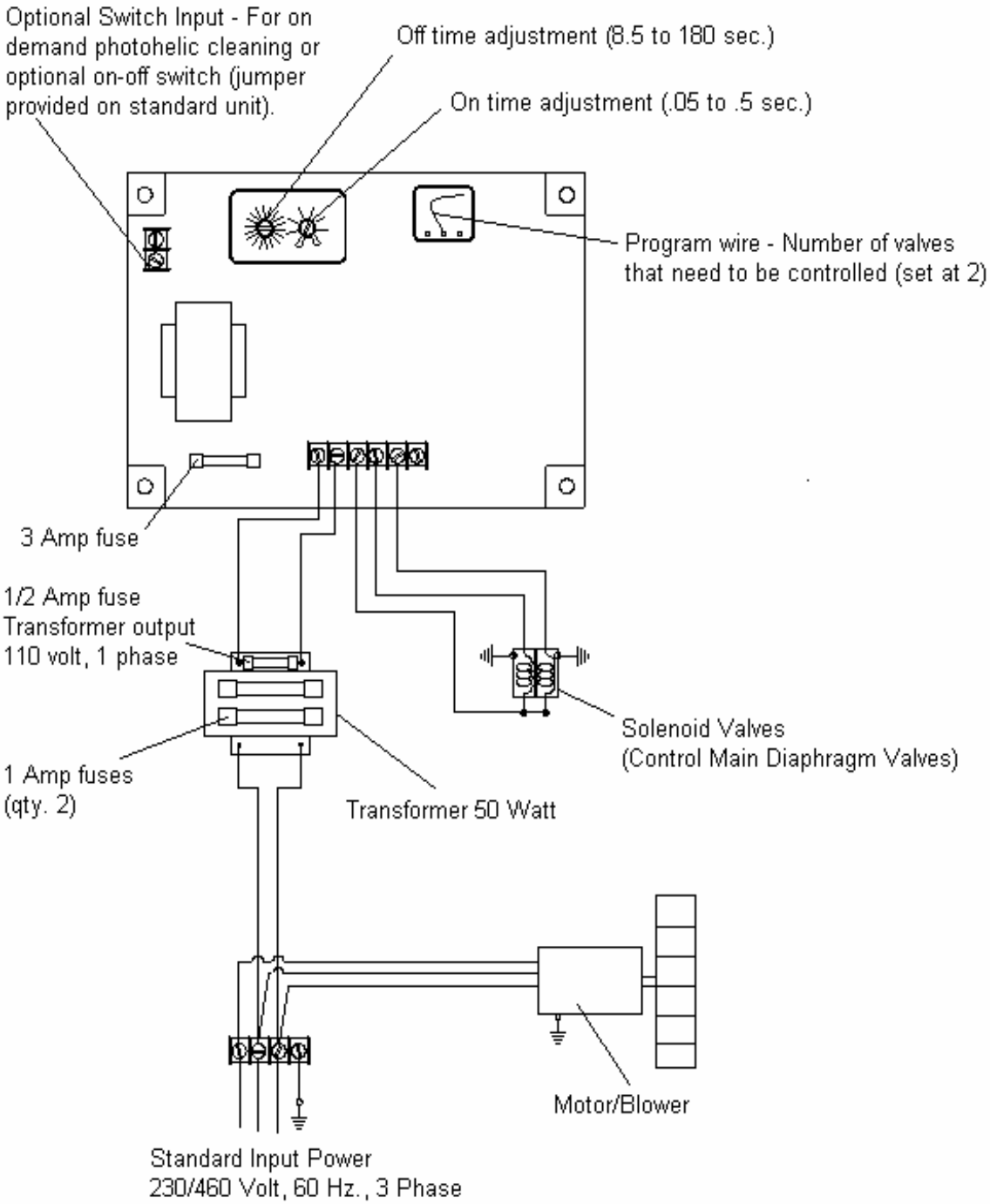

Figure 2 - Control Timer

SECTION 3

Installation continued

WARNING
Permanent damage to the motor will be sustained if connected to voltages other than the normal operating voltage for which the unit is pre-wired.

Control Systems

AUTOMATIC CONTROLS for the VCF series with the exception of the VCF-1 include an integrated, electrically operated pilot solenoid valve for each diaphragm valve. The solenoid valves are controlled by a solid-state sequential control timer that determines the order in which the solenoid valves are operated, the length of time that the valves remain open, and the time interval between each valve opening. The compressed air tank and valves are fully enclosed and located between the cartridges and the blower. The sequential control timer, input power connection, transformer and indicator light are contained in the electrical box mounted on top of the unit. The VCF-1 uses a manual push-button control for operating the diaphragm valve to pulse clean the cartridges.

WARNING
Take special care when the electrical box is opened. When power is ON, the full line voltage can appear from any electrical point on the circuit board to the metal enclosure or to ground.

Compressed Air Requirements

Air reservoir pressure should be set between 90-psig (the minimum pressure which will assure truly effective cleaning of the cartridges) and 105-psig (the maximum recommended working pressure of the valves and air reservoir).

Note: The air reservoir system has a 120-psig-relief valve.

The total consumption of compressed air is variable and is dependent upon the set points of the ON and OFF time of the timer and the air pressure in the reservoir at the time of the air pulse. When the ON timer is set at its recommended time of 0.1 second and the air reservoir pressure is at 100-psig, approximately 0.9 cubic feet of free air will be used per pulse. While the cartridges are being cleaned, the average usage rate in CFM of free air depends upon the setting of the OFF timer. If set at 30-second intervals (2 pulses per minute) the average usage rate during a cleaning cycle would be (0.9 cu. ft./pulse) x (2 pulses/minute) = 1.8 CFM of free air.

SECTION 4

Ordering Replacement Parts

Information required for prompt delivery of replacement parts will be:

1. Model and Serial Number
2. Part Number and Description

Contact your local AER Control Systems LLC. distributor for replacement parts. Use either our toll free telephone number or our website www.aercontrolsystem.com to obtain the nearest AER Control Systems LLC. distributor's name and telephone number.

1-866-265-2372

Part Number	Description	Qty			
		VCF-1	VCF-2	VCF-4	VCF-6
1017-05	Blower Inlet Cone 280	1	-		
1017-06	Blower Inlet Cone 315	-	1		
1015-04	Blower Inlet Cone 15"	-	-	1	-
1015-05	Blower Inlet Cone 16"	-	-	-	1
1016-05	Blower Wheel 280	1	-		
1016-06	Blower Wheel 315	-	1		
1013-02	Blower Wheel 15" - 5 HP	-	-	1	-
1027-01	Blower Wheel 16" - 7.5 HP	-	-	-	1
1027-01	Blower Wheel 16" - 10 HP	-	-	-	1
1003-10	Motor, 1.5HP	1	-		
1003-15	Motor, 3HP	-	1		
1003-17	Motor, 5HP	-	-	1	-
1003-18	Motor, 7.5HP	-	-	-	1
1003-20	Motor, 10HP	-	-	-	1
1043-08	Cartridge One End Open 30" L	1	1		
1218-03	Diaphragm Soleniod Valve 1"	-	2		
1218-01	Diaphragm Air Valve 3/4"	1	-		
1218-05	Diaphragm Soleniod Valve 1.5"	-	-	2	3
1220-01	Control Timer Board	-	1	1	1
1111-01	Diffusion Nozzle	1	2	4	6
1110-01	Pushbutton Relief	1	-	-	-
1089-01	Pressure Relief Valve	1	1	1	1
1233-11	Transformer, 50W	-	1	1	1
1224-22	1 amp Fuse	-	2	2	2
1224-18	1/2 amp Fuse	-	1	1	1
1084-01	Louvre, Exhaust 14 x 8	-	1	-	-
1221-01	Delay Relay Timer (optional)	-	1	-	-

SECTION 5

Maintenance

Operation & Maintenance

Lubrication or other routine periodic preventative maintenance is not required. All that is needed is an occasional check of fasteners, hoses and clamps and an overall visual check of the unit . Periodic replacement of the cartridges is required when necessary and check/ draining of condensation from air reservoir. Draining can be done automatically if the drain is opened (slowly) while the tank is under pressure. Always empty the dust storage drum before it fills completely. Do NOT allow the dust to collect to the point where it begins to fill the flexible hose and enter the bottom of the hopper, since this would result in the dust being re-entered into the air stream, re-depositing on the cartridges and shortening their life. Do NOT use the hopper as a dust storage device!

Cartridge Replacement VCF-1 and VCF-2

The pressure drop across the cartridges will eventually reach a point at which the airflow and suction are too low. At this time, the cartridges should be replaced as follows:

1. Shut off electrical power to the blower and control box.
2. Open the cartridge access door on the front of the filter cartridge module.
3. Remove the thumbscrews on the cartridge lift bars and drop down the two cartridge lifting bars by lifting them off the support tab and swing the bars back into the cabinet.
4. Slide the cartridges out on the track by grabbing the cartidge header and pulling toward you. Remove the cartridges for inspection or replacement.
5. Reinstall cartridges by sliding the cartridges into the cabinet on the track and swing the lift bars up onto the support tabs and lock in place using the thumbscrews. The lift bars compress the gasket on the cartridges for sealing purpose.
6. Close the cartridge access doors.

Cartridge Replacement VCF-4 and VCF-6

The pressure drop across the cartridges will eventually reach a point at which the airflow and suction are too low. At this time, the cartridges should be replaced as follows:

1. Shut off electrical power to the blower and control box.
2. Open the cartridge access door on the front of the filter cartridge module.
3. Remove the theaded knob on the cartridge lift bars and drop down the cartridge lifting bars and swing the bars back into the cabinet.
4. Slide the cartridges out on the track by grabbing the cartidge header and pulling toward you. Remove the cartridges for inspection or replacement.
5. Reinstall cartridges by sliding the cartridges into the cabinet on the track and swing the lift bars up and lock in place using the threaded knobs. The lift bars compress the gasket on the cartridges for sealing purpose.
6. Close the cartridge access doors.

Troubleshooting

Problem	Cause	Solution
Motor Fails to Start	No Power To Unit (indicator light is not lit.)	Check overload heaters in starter and fuses, replace or reset if necessary. Check for proper wire connections to and from the starter and collector.
	Power to unit (indicator light is lit.)	Check wires from input electrical box on the collector to the motor. Check motor wiring. Check to see if motor is faulty.
Low airflow and/or suction	Blower is running backwards	Check rotation of blower. If running backwards, interchange 2 of the 3 input power leads (3 phase motors only).
	Cartridges are not being cleaned	Check air pulse system to see if it is working correctly. Check air pressure.
	Obstruction in ducting	Check ducting for blockage. Check for dampers in the duct system, they may be closed. Improper duct design.
Contaminant blowing out of the collector exhaust	Hole in the cartridge	Replace cartridge.
	Cartridge not properly installed	Check for correct cartridge orientation. Check cartridge gasket, gasket must seal around hole in tube sheet of cartridge cabinet. Check cartridge access door, knob should be tight for proper door and filter sealing
Unit is not pulsing, but motor is running	No power to timer board	Check for blown fuses, replace if necessary. Check transformer.
	Power is getting to timer board	Check to see if compressed air is on, and connected to unit. Check wiring from board to valve assembly. Check to see if valves are opening.
Unit is not pulsing, but motor is running (units with delay timer or Photohelic pulse option)	Not set properly	Check timer set points. Off time be set for a longer period than you expect. Check high and low pressure set points on the Photohelic gauge. High pressure set point may be set too high.
Unit pulses all of the time	Off time may be set too short.	Check timer board settings, Timer board is designed for pulse intervals every 8.5 sec to 3 minutes.
	Set times on the Photohelic Gauge option are not properly set	High Pressure and/or Low Pressure set points may be set too low.

Specifications

Specifications	VCF-1	VCF-2	VCF-4	VCF-6
Nominal Airflow - CFM	750	1500	2000/3500	3500/5000
Available External pressure - IN. H2O	2	3	4/5	5/4
Filters - Qty.	1	2	4	6
Total Filter Area - Sq. Ft.	274	548	1096	1644
Motor - HP	1.5	3.0	5/7.5	7.5/10
Motor Temp. Max - C	40	40	40	40
Compressed Air	90-105 psig	90-105 psig	90-105 psig	90-105 psig
Tank Qty.	1	1	1	1
Tank Volume - Cu. Ft.	0.25	0.32	0.65	0.65
Diaphragm Valve	(1) .75 in.	(2) 1 in.	(2) 1.5	(3) 1.5
Program Timer: Off TIme	Manual - Pushbutton	Solid State 8.5 sec to .80 sec	Solid State 8.5 sec to .80 sec	Solid State 8.5 sec to .80 sec
On Time		0.05 sec to .50 sec	0.05 sec to .50 sec	0.05 sec to .50 sec
Timer Input Power	N/A	110 VAC, 60 Hz, 1 PH	110 VAC, 60 Hz, 1 PH	110 VAC, 60 Hz, 1 PH
Blower/Motor Type	Plug Fan	Plug Fan	Plug Fan	Plug Fan
Inlet	1 std. up to 2 available	1 std. up to 4 available	1 std.	1 std.
Wheel Diameter	11 inches	12 inches	15"/ 16"	16"
Speed	3450 RPM	3450 RPM	3450 RPM	3450 RPM
Drive	Direct	Direct	Direct	Direct
HP	1.5	3.0	5.0/7.5	7.5/ 10.0
Voltage	190/380//230/460	190/380//230/460	190/380//230/460	190/380//230/460
Frequency - Hz	50/60	50/60	50/60	50/60
Phase	3	3	3	3
Frame - NEMA	56C	56C	184TC	215TC
Power Factor	71	89	93/94	94/90
Efficiency	75.5	82.5	85.5/87.5	87.5/87.5
Strart Current Amps (60Hz)	22/11	65.8/32.9	94/47 // 152/76	152/76 // 174/88
Full Load Amps (60Hz)	3.6/1.8	7.6/3.8	12/6 // 17.2/8.6	17.2/8.6 // 23.8/11.9
Insulation Class - Min.	B	F	F/F	F/F
Enclosure	TEFC	TEFC	TEFC	TEFC
Service Factor	1.5	1.5	1.15/1.0	1.0/1.15
Duty Cycle	Continuous	Continuous	Continuous	Continuous
Bearing Grease	Exxon POLYEX EM	Exxon POLYEX EM	Exxon POLYEX EM	Exxon POLYEX EM
Specification	UL & CSA Approved	UL & CSA Approved	UL & CSA Approved	UL & CSA Approved

Limited Warranty

AER Control Systems LLC warrants all products sold only to purchasers for use in business or for resale, against defects in workmanship or materials under normal use, for one (1) year after the date of purchase from AER Control Systems LLC. Misapplication of the product, decomposition by reaction or chemical action and wear caused by abrasion will not constitute, or be considered as a defect. Warranty is void if the product has been subject to damage, unreasonable use, neglect, improper service, improper installation, or other causes not arising from defects in original materials or workmanship. Any part that is determined to be defective in material or workmanship and returned to an AER Control Systems LLC distributor or authorized service facility, as AER Control Systems LLC designates, shipping costs prepaid, will be, as the exclusive remedy, repaired or replaced at AER Control Systems LLC's option. AER Control Systems LLC shall not be liable for any incidental or consequential cost, expenses, or damages resulting from any failure, defect, or malfunction of this product, liability is expressly disclaimed. AER Control Systems LLC's liability in all events is limited to and will not exceed, the purchase price of the product. Title and risk of loss pass to the buyer on delivery to the common carrier. If a product is damaged in transit, the recipient MUST make note of the damage upon receipt of the product and file a claim with the carrier. AER Control Systems LLC will make a good faith effort for prompt correction or other adjustment, with respect to any product that proves to be defective within the warranty period.

Collection of combustible or explosive materials and collection on flame or spark-generating operation any require specific system configurations (contact AER Control Systems LLC's Applications Engineering Department for questions and/or design assistance). The combined collection of combustible or explosive materials and contaminants from spark or flame generating operations, with a common collector or duct system, is not recommended, unless special design provisions have been made to the system (sparks or flames resulting from such operations may ignite the combustible or explosive material). Under no circumstances should anyone be allowed to discard a lighted cigarette, other burning materials, or refuse into an inlet hood or the duct of the collection system. It is the responsibility of the end user to comply with all applicable national, state, and local fire and safety codes. AER Control Systems LLC's liabiltiy for consequential and incidental damage resulting from a fire or explosion is expressly disclaimed.

Installation of suitable overload protection such as a motor starter, according to NEC guidelines, is required. Failure to provide proper overload protection will void warranty coverage on electrical components in the system. (Combination motor starters with fusible disconnect packages are available through your local AER Control Systems LLC representative). To ensure optimum collector performance, always use AER Control Systems LLC replacement filters.