Vortech Recovery System

ITW Gema

Service Manual

MODEL
6K, 8K, 10K, and 12K CFM

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ITW Gema
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Introduction

WARNING!

- The user **MUST** read this manual and be familiar with the ITW Gema safety literature therein identified.

- This manual **MUST** be read and thoroughly understood by ALL personnel who operate, clean or maintain this equipment! Special care should be taken to insure that the WARNINGS and safety requirements for operating and servicing the equipment are followed. The user should be aware of and adhere to ALL local building and fire codes and ordinances as well as *NFPA STANDARD 33 AND THE OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970 (OSHA)* prior to installing, and/or servicing this equipment.

About This Manual

- Before operating, maintaining or servicing any ITW Gema electrostatic coating system, read and understand all of the technical and safety literature for your ITW Gema products. If you do not have the manuals and safety literature for your system, contact your local ITW Gema distributor or ITW Gema factory representative.
- All text references to diagrams or illustrations will appear as a circled number (as indicated in the Parts Identification Section), i.e.: Item number five in the Parts Identification will appear as Î throughout the text and all diagrams and illustrations, except where otherwise indicated.
- In the manual, as in all ITW Gema technical and safety literature, the following advisories will be provided where appropriate:

  DANGER! States a clear and present hazard to personnel safety!
  WARNING! States information relevant to personal safety!
  A **CAUTION!** *Is information relevant to safeguarding equipment!*
  A NOTE *is information about the procedure in progress.*

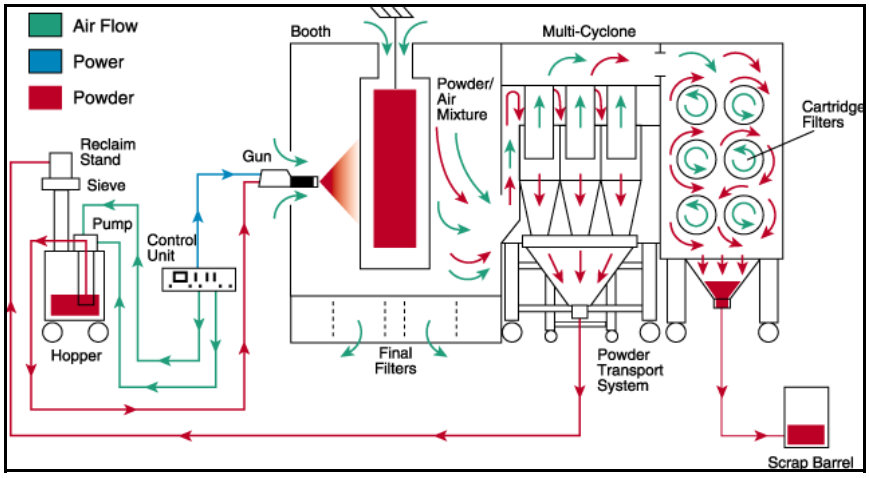
- The Information in this document is intended ONLY to indicate the components and their working relationship in typical use. These are NOT installation instructions. Each installation is unique and should be directed by a ITW Gema representative or made from the ITW Gema installation drawings provided for your particular installation.
- This manual provides information for the service and maintenance of the Vortech systems. While this book lists standard specifications and procedures, some minor deviations may be found between this literature and your equipment. Differences in local codes, plant requirements, and material delivery requirements, etc. make such variations inevitable. Compare this manual with your ITW Gema system Installation drawings and appropriate ITW Gema equipment manuals to reconcile such differences.
- Careful study and continued use of this manual will provide a better understanding of the equipment and the process, resulting in more efficient operation, longer trouble free service and faster, easier troubleshooting.
- Please conduct the specified tests and checks before requesting service assistance, and have this manual in hand for ready reference when requesting such assistance, We recommend that maintenance or operating personnel who are familiar with the service problem be authorized to contact us when service is required.
- For assistance, contact your local ITW Gema Distributor or the Technical Assistance Desk at (800) - 628 - 0648.

Vortech Recovery System

The Vortech powder recovery unit is designed to deliver the industries most versatile and flexible color changing and recovery system. The Vortech unit features both integrated mini-cyclone and cartridge filter style powder collection in one system. The recovery unit attaches directly to the booth, minimizing space needs and diminishing potential contamination concerns by eliminating the need for ductwork. The Vortech works effectively for both manual and automatic spray operations. Vortech units are designed to work either in a reclaim mode or a scrap mode.

Reclaim and Scrap Modes

In reclaim mode, air/powder is drawn into the cyclone inlet portion of the unit. The powder is separated by cyclonic action that spins out the reclaim powder to a dropout hopper where it is transferred back to the spray hopper. The separated air and residual scrap powder is discharged to the cartridge collector where it is separated by cartridge filters and collected in the base of the unit.



In scrap mode the cyclone section is covered and the door(s) to the cartridge filter section is removed. Air/powder is then drawn directly into the collector section by passing the cyclone circuit. In this mode, all of the powder is captured with the cartridge filters. An intermittent backpulse of compressed air into the cartridge filter causes powder to be released from the surface of the filters and collected in the base of the unit.

Auto Damper Control

The Autodamper ensures that the system maintains the same CFM (booth flow) independent of the readings on the cartridge and final filters until the damper is 100% open. This is accomplished through automatic adjustment of the damper as required to maintain the CFM air volume based on a velocity pressure reading. The velocity pressure is an averaged reading of the air moving through the system at the point of measurement by the Pilot tube. This reading is used as a reference to calculate the CFM of the system.

By adjusting the high and low set-point on the photohelic gauge, the system CFM is adjusted higher or lower by automatically changing the position of the damper assembly. When the needle on the photohelic gauge goes below the low set-point, internal contacts are closed and the damper actuator engages opening the damper until the needle reads between the set-points on the photohelic gauge. The same thing happens when the needle rises above the high set-point except, the damper closes until the needle is back in-between the set-points. Normally the needle will only rise above the high set-point when the scrap doors are removed to run in spray to waste mode.

The system continues to monitor the pressure velocity, automatically adjusting the damper setting accordingly, to maintain the same CFM over time until the damper reaches the full open position. During this time, the static pressure increases on the cartridge and final filters. When the damper can no longer open to compensate for the pressure increase on the filters, the reading on the photohelic gauge will begin to drop. This pressure velocity reading will continue to drop as the filters are loaded with more and more powder until the warning and shutdown points is reached for the Cartridge or Final filters. The warning and shutdown settings may not be reached until the system CFM is too low to operate efficiently.

Formula for calculating CFM based on the photohelic gauge reading.

- (Pv) = Velocity Pressure (reading on the Photohelic gauge)
- (FPM) = Velocity of the air in Feet per Minute.
- (Sq. Ft.) = Square feet of fan inlet cone opening.
  (6k = 0.68, 8k = 0.867, 10k = 1.07, 12k = 1.08)
- (CFM) = Volume of air being moved in cubic feet.
- **Sq. Root. Of (Pv) * 4005 = (FPM)**
- **(FPM) * (Sq. Ft.) = CFM**
- Total pressure – Total pressure is the combination of velocity pressure and static pressure.

Photohelic gauge

- Static Pressure – Pressure that is independent of the velocity or movement of air and acts in all directions.
- Velocity Pressure – The force of the air moving in a certain direction created by the fan.
- System static pressure – The total amount of pressure created by restrictions in the system, i.e., cyclones, filters, fan, ductwork… that has to be overcome by the motor and fan to run the system at the desired CFM.

Pressure drop – The difference in static pressure before and after a component in the system (fan, filters, pressure drop across the fan or cartridge filters.)

Vortech Air Volume Data Sheet

(Based on Inlet Cone Mounted Pitot Tubes)

Unit	Booth Air Volume	Min. St.pnt.	Max. St.pnt.	Actual Reading
Vortech 6K	5000 CFM	3.1	3.6	3.3
	5200 CFM	3.3	3.9	3.6
	5400 CFM	3.6	4.2	3.9
	5600 CFM	3.9	4.5	4.2
	5800 CFM	4.2	4.7	4.5
	6000 CFM	**4.5**	**5.1**	**4.8**
	6200 CFM	4.8	5.4	5.1
	6400 CFM	5.1	5.8	5.4
Vortech 8K	6600 CFM	3.3	3.8	3.5
	6800 CFM	3.5	4.0	3.8
	7000 CFM	3.8	4.2	4.0
	7200 CFM	4.00	4.46	4.23
	7400 CFM	4.2	4.7	4.5
	7600 CFM	4.5	5.0	4.7
	7800 CFM	4.7	5.2	5.0
	8000 CFM	**5.0**	**5.5**	**5.2**
	8200 CFM	5.2	5.8	5.5
	8400 CFM	5.5	6.0	5.8
Vortech 10K	8600 CFM	3.8	4.1	4.0
	8800 CFM	4.0	4.3	4.1
	9000 CFM	4.1	4.5	4.3
	9200 CFM	4.3	4.7	4.5
	9400 CFM	4.5	4.9	4.7
	9600 CFM	4.7	5.1	4.9
	9800 CFM	4.9	5.4	5.1
	10000 CFM	**5.1**	**5.6**	**5.4**
	10200 CFM	5.4	5.8	5.6
	10400 CFM	5.6	6.0	5.8
Vortech 12K	10600 CFM	5.8	6.2	6.0
	10800 CFM	6.0	6.5	6.2
	11000 CFM	6.2	6.7	6.5
	11200 CFM	6.5	7.0	6.7
	11400 CFM	6.7	7.2	6.7
	11600 CFM	7.0	7.5	7.2
	11800 CFM	7.2	7.7	7.5
	12000 CFM	**7.5**	**8.0**	**7.7**
	12200 CFM	7.7	8.2	8.0
	12400 CFM	8.0	8.5	8.2

Photohelic Set-point Instructions

1. Determine booth containment air volume.
   (Calculated by ITW Gema Project Engineer.)
1. Select the corresponding unit from the data table.
2. Match booth air volume on the table with the information provided from the ITW Gema Engineer.

On the photohelic adjust the minimum and maximum set-points based on the booth containment air volume.

Static Pressure Readings

Cyclone Section
A barb is supplied on the cyclone section to take a static pressure reading across the cyclones. This is used for testing purposes only. The reading is taken by connecting tubing between the pressure tap and low side of a pressure-monitoring device, with the other side open to atmosphere. This reading may be taken at any time while running. The tap should be plugged when not in use*. Note: The extra low port should be plugged and the two high ports open on a magnehelic gauge*.

Collector Section
Magnehelic / Transducer – This device measures the difference in static pressure between the clean side and the dirty side of the cartridge collector. This is the static pressure on the cartridge filters or the pressure drop across the filters. The pressure tap on the **clean side** is connected to the **low port** on the magnehelic or the **P1 port** on the transducer. The **dirty side** pressure tap is connected to the **high port** on the magnehelic or the **P2 port** on the transducer. (Note: On the magnehelic gauge the extra high and low ports should be plugged

To take the reading on a different gauge the lines **can not** be removed while the booth is running. The booth must be turned off and both lines removed, then restarted to take the reading. The same thing applies when the lines are reconnected. This is because the difference is read between the clean and dirty side and if a line is removed then a high static pressure is sensed causing the booth to shut down.

Blower Photohelic Gauge
The reading on the photohelic is the velocity pressure at the inlet cone of the fan. This reading is coming from twin pitot tubes mounted in the inlet cone. Each tube is self averaging and is read on the photohelic gauge. The reading on this gauge is an indication of the CFM the system is providing. By adjusting the high and low set-points on the photohelic gauge the damper opens and closes accordingly. Reference the above formulas for calculating CFM from the velocity pressure on the photohelic gauge. *Note: The velocity pressure indicated on the photohelic gauge will read lower in a higher altitude. Approximately 20% to 25% lower for 1 mile above sea level.*

Final Filter
Magnehelic / Transducer – This device measures the static pressure in the final filter plenum. This is a back-pressure reading caused by the restriction of air passing through the final filters. The pressure tap on the final filter plenum is connected to the **high** port of the magnehelic or the **P2 port** on the transducer. (Note: The extra high port should be plugged and the two low ports should be unplugged on the magnehelic gauge.)

Transfer Pumps

Controls for the collector and cyclone transfer pumps and vibrators are pre-plumbed and mounted in the pulse down section of the Vortech unit. For the collector transfer pumps and vibrator, two couplings are mounted to the collector leg gusset. From there, airlines are teed and run to the individual transfer pumps and vibrator. For cyclone transfer pumps and vibrator, a plate is welded to the leg of the cyclone drop out hopper. From there the lines will also tee and run to the individual pumps and vibrator. Placement of this coupling was done so that main air lines to the cyclone transfer pumps and vibrator could be disconnected, and the cyclone transfer section unit rolled away during color change. Another possibility is to have a single cyclone unit and multiple dropout sections with dedicated transfer pumps.

Prewire / Pre-plumb Requirements

Vortech Booth Airflow Calculation Sheet

This sheet contains formulas for calculating system airflow for the photohelic gauge set-point. It also contains places to note booth airflows and formulas for calculating CFM based on the total square footage of all the openings in the booth. Readings should be taken at each opening from top to bottom and left to right. Average each opening airflow velocities and then average the total airflow velocities together. The opening square ft. can be measured or supplied from a ITW Gema Engineer. Multiply the total sq. ft. by the average opening velocity to get the booth CFM. This number should be consistent with the CFM volume from the data sheet within +/- 500 CFM. *Care should be used so that the readings are taken at a consistent distance from all openings.*

VESTIBULE ENTRANCE	
A	
B	
C	
D	
E	
F	
AVG	

VESTIBULE EXIT	
A	
B	
C	
D	
E	
F	
AVG.	

OP.	SQ. FT.	AVG. VEL.
V. ent		
V. ext		
OP. 1		
OP. 2		
GS1		
GS2		
GS 3		
GS 4		
CS		
AVG		

OPERATOR OPENING	
A	
B	
C	
D	
AVG	

OPERATOR OPENING	
A	
B	
C	
D	
AVG.	

GUNSLOT 1	
A	
B	
C	
AVG.	

GUNSLOT 2	
A	
B	
C	
AVG.	

CONVEYOR SLOT		
Entrance	A	
	B	
	C	
	D	
	E	
Exit	F	
AVG.		

GUNSLOT 3			GUNSLOT 4	
A			A	
B			B	
C			C	
AVG.			AVG.	

PHOTOHELIC SETTINGS

Low / High	Actual. Pv		FPM	FAN INLET AREA	C.F.M.	CY. Ps	COLL Ps CLN

PHOTOHELIC CFM FORMULAS:
FPM = SQ.RT. OF Velocity Pressure (Pv) **X** 4005

Fan Inlet Sq. Ft.: (6K = 0.68, 8K = 0.867, 10K = 1.07, 12K = 1.08

CFM = Fan Inlet Sq. Ft**. X** FPM

CFM:

_____

BOOTH CFM FORMULA:
CFM = Total Sq. Footage **X** Avg. Velocity

Booth CFM:

_____

Electrical Requirements

Exhauster Power Cable Assembly

- Blower motor

5 pole Connomac for Collector Controls.

- Pulse Down Timer Board.
- Cyclone Transfer Pump Solenoid.
- Collector Transfer Pump Solenoid.

5 pole Connomac for Auto Damper Control.

- 120 VAC Damper Control Motor Power.
- 120 VAC Photohelic Gauge Power.

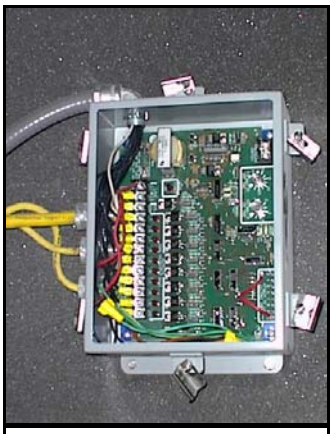
Air Requirements

1/4" Tubing

- Collector Pressure Reading.
- Final Filter Pressure Reading.

3/4 inch Supply Airline from Booth Manifold.

- Pulse Down Regulator.
- Cyclone Transfer Pump Regulator.
- Collector Transfer Pump Regulator.
- Cyclone Dropout Hopper Vibrator.
- Collector Plenum Vibrator.



Pulse down / Transfer control board

Air gauges

Transfer / Vibration Air connections

Standard Vortech Components

Cyclone Section

- Inlet vanes – Start the air turning and create the cyclonic action
- Cyclone tubes
- Transfer container baffles – Located in the transfer hopper. These are used to keep the powder from being re-entrained into the system and sent to scrap.
- Transfer hopper – Collection container for reclaimed powder.

Cartridge filter section

- Clean side – pulse down section
- Dirty side – filter side
- Cartridge filters
- Static T-tube

Blower Housing

- Fan wheel
- Inlet cone
- Pitot tube
- Fan motor
- Damper actuator
- Damper assembly
- Photohelic gauge
- Actual Needle – The needle representing what velocity pressure the system is running at.
- Set-point Needles – The two needles used to set a high and low range for the actual needle to operate in.
- Transition Duct
- Final Filter Plenum & Filters

Color Change Procedure

All procedures, unless

Blower housing

otherwise indicated, are performed with the booth blower in operation and application equipment turned off.

Application Equipment Cleaning

- Force compressed air through hoses and powder guns to remove powder.
- Clean gun nozzle, muzzle nut and powder hose connection with compressed air.
- Wipe off any remaining powder on the surface of the guns.
- If possible, withdraw guns from booth.
- If sieve is to be cleaned, do so now.

Reclaim Stand - Sieve and Hopper

If sieves dedicated to specific colors are used, connect the vent assist lines to the appropriate sieve and transfer hose. Note: We recommended that all hoses be color dedicated.

Sieve Cleaning - Vibratory Sieve

- Turn reclaim off.
- Disconnect transfer hoses at sieve inlet.
- Remove upper section of sieve body by removing retainer bolts and clean.
- Remove sieve screens and clean.
- Clean lower body of sieve.
- Remove hose connecting sieve to hopper.
- Clean hopper.
- Reassemble sieve body.
- Ensure that ground wire is in place.
- Replace hose connecting sieve to hopper.

Sieve Cleaning - Rotary Sieve

- Turn reclaim off.
- Remove transfer hoses, sieve vent hose from the transition canister.

Cleaning

- Turn off air to vent assist and hopper fluidization If large master hoppers with vent assist (air movers) are used. Disconnect hopper vent assist from booth.
- Squeegee powder from booth panels and floor into the opening of the multi-cyclone unit. Leave the reclaim on. This will transfer the powder cleaned from the booth back to the hopper, if the booth is in a recovery mode. If the booth is used in a spray-to-waste mode powder may be pushed into the collector opening.
- Vacuum remaining powder from all interior surfaces and wipe booth walls with a damp cloth or rag mop to remove residual powder.
- Visually inspect booth interior surfaces to make sure that there are no residual traces of the previous color.

Vortech Recovery Unit Cleaning

Recovery Transfer Container

- Shut down system.

- Remove doors and recovery transfer container.
- Restart system.
- Clean recovery transfer bin baffle and the doors with compressed air, using the wand attachment.
- Push powder on the slanted side-walls of the container into the lower section. Vacuum powder from the bottom of the container. Then wipe clean the inner surfaces of the recovery transfer container and baffle. (Note: if container is dedicated to one color disregard this step).

  - Disconnect the pneumatic quick disconnects and the pneumatic vibrator. Remove and clean the transfer pumps with a vacuum or compressed air. Disconnect transfer hoses from the transfer pumps and clean

Multi-Cyclone

- Blow off entrance plenum with compressed air using wand attachment.
- Manually raise the inlet vane ring on each mini-cyclone and clean with compressed air. Access to these vanes is available from the interior of the booth, as well as from a door in the rear of the multi-cyclone.
- Vacuum the tube sheet, or lower surface of the multi-cyclone module. The lower six inches of the mini-cyclones are accessible from the tube sheet for cleaning.
- Polish all surfaces with damp, lint free cloth.
- Replace transfer container baffles and inspect gasket.
- Shut system down.
- Replace doors.
- Reclamp the transfer container and ensure a proper seal.
- Restart system.
- Reconnect the pneumatic quick disconnects to the supply lines. They should be numbered to ensure that the air-lines are not mis-connected.

Inlet vanes

- Install transfer hoses and pumps for the new color.
- System Components for New Color
- Put new hopper and/or hopper and sieve in place.
- Ensure that transfer hoses from the Vortech transfer container and fresh powder feed unit if used, are in place.
- Re-connect vent hoses, pump control air lines, and pneumatic

quick disconnects.
- Connect powder gun supply hoses from the gun to the pump.

Remember, the PGC control, pump, red and blue pneumatic quick disconnects, powder hose and gun all have the same number - they form a set.

Changing from Reclaim to Scrap Mode
Reclaim Mode Operation – All powder is ran through the cyclone section, separated into the drop out hopper where it is transferred back to the hopper to be reused.

- Connect cyclone to the booth and collector.
- Locate and clamp the dropout hopper into place under the cyclone section.
- Install transfer pumps and hoses on the dropout hopper. The hose will be routed to the reclaim hopper.
- Connect the two air lines to the quick disconnect on the dropout hopper leg. One airline is for the transfer pump control air; the other is for the vibrator on the dropout hopper.
- Transfer pumps and vibration should be on continuously while in the reclaim mode.

Note: *In a spray-to-waste mode the entrance to the multi-cyclone unit will be covered and the doors into the collector will have been removed).*

Scrap Mode Operation
The powder bypasses the cyclone section and is captured by the Cartridge Filter section of the Vortech. This powder is waste and is not transferred back to a hopper.

- Perform the booth color change procedure.
- Turn the system off.
- Remove the access doors on the collector section of the Vortech.
- Install the cover door in the cyclone section opening.
- Note: No changes are required on the photohelic gauge set-points. Once the system is started the damper will close to bring the actual needle back into the operating range.
- Turn on the system and spray.


Collector cartridge filters

Cyclone Efficiency

- Cyclone efficiency is based on the separation of a known amount of powder /air mixture that enters the cyclone vs. the amount of powder reclaimed over a certain time. The amount reclaimed divided by the amount that enters the cyclone multiplied by 100 will give the cyclone efficiency.

- Variables that effect Cyclone Efficiency.
- Inlet vane placement. (Must be even with or slightly below the entrance to the cyclone body. The vanes are provided with a slot for the vane to drop in.)
- Drop out hopper seal against the tube sheet.
- Drop out baffle plate alignment.
- Powder filling up the drop out hopper.
- Seal between the cyclone and the cartridge collector.
- Low airflow through the cyclones.
- Door seals on the cartridge collector.
- Amount of powder sprayed.
- Amount of time the powder was sprayed within reason should not effect cyclone efficiency
- The scale resolution.

Cyclone Efficiency Test Procedure

- Clean the Cyclone section.
- Turn system off.
- Remove the drop out hopper from the cyclone section and clean. (Note: The transfer pumps need removed and the holes plugged.)
- Weigh the drop out hopper empty. (DOE)
- Weigh the powder to be sprayed (100lbs or more is recommended). (HF)
- Place powder hoses directly in front of the cyclone section opening.
- Turn the system on.
- Spray the powder and record the time it takes to empty the box or hopper.
- Turn system off.
- Remove the drop out hopper and record the weight with the powder. (DOF)
- Weigh the hopper from which the powder was sprayed. (HE)
- Calculations: (HF) – (HE) = (PS), (DOF) – (DOE) = (PR)
- Divide the weight of the powder reclaimed (PR) by the amount of powder sprayed (PS) and multiply by 100 to get the cyclone efficiency percentage.

System Performance Variables

Cyclone

- Dropout hopper seal. - Must maintain a seal to prevent air leakage which drops cyclone efficiency.
- Cyclone dropout diffuser plate alignment. - Must be aligned correctly for cyclone efficiency. Plate at the top causes powder to fall into the hopper and not be entrained into the air stream.

- Transfer pumps - Need to run continually so powder does not build up in the hopper and get entrained into the air stream and sent to scrap.
- Vibrators working correctly. - Helps keep the powder from building up on the side walls and from bridging at the transfer pump exit ports.
- Seal between Cyclone and Collector. - Must be sealed so that air does not leak past and decrease cyclone performance.

Collector

- Scrap door seal. - Must be sealed so powder does not bypass around and decrease cyclone efficiency.
- Cartridge Filters are tightened. - Must be tightened or powder will pass through and blind final filters.
- Yokes are adjusted and tightened. - Powder could pass around the gaskets and blind the final filters.
- Pulse down timing and pressure set correctly (10 sec off / 0.1sec on, 60 psi).
- Verify cartridge filter and final filter static pressure readings are correct.
- Scrap powder level. - Can not build up higher than the booth floor. Excessive powder build up in the scrap collector can get airborne and shorten the cartridge filter life.

Blower Section

- Damper operating correctly.
- Pitot tube location. - Mounted in ductwork in systems before November '98, and in the inlet cones for systems after November '98
- Pitot tube is not blocked.
- Pitot tube lines are clear.
- Photohelic is working correctly and repeatable.
- Test the photohelic against another monitoring device.

Vortech Unit Troubleshooting Guide

Problems	Solutions
Final filter static pressure raises to shutdown level. Powder leaking past the Cartridge filters causing the final filters to blind.	Verify the reading is correct with another gauge. Inspect the airline running from the pressure tap to the magneheilic gauge. Remove the cartridge filters and adjust filter yokes so they have a slight upward angle. Adjust the top two nuts on the dirty side of the collector all the way in on the thread. Put the bottom nut on the dirty side half way in on the threads. Tighten all nuts on the clean side. Cartridge filter cover plates should be tightened down until the knob bottoms out on the threads.
Cartridge filter magnehelic gauge does not read correctly.	Verify that the reading is good by using another gauge. If readings are different, powder may be plugging up the pressure "T" tube inside the collector. Blow out the lines and inspect the "T" tube. Move the pressure tap to a higher location on the collector.
Damper motor not operating or failed.	Turn the system off. Turn the incoming power disconnect on the blower off. Push the system start button to turn the system back on. The blower will not run but power will be sent to the photohelic gauge and the damper motor. Adjust the two set point needles below the running needle, (running needle will be at 0), this will close the damper. Adjusting the set-point needles above the running needle will open the damper. Remove transition duct access panel to verify if damper is moving.
Damper motor fails to adjust.	Make sure the power disconnect on the blower housing is turned off and locked out by proper lockout tag out procedures. Remove the access panel on the side of the blower housing. Visually inspect the damper motor shaft turning by using the above set-point adjustment method. If the damper does not operate, remove the damper motor cover and photohelic cover and check wiring connections per ITW Gema print 125528. Check for power (120VAC) on the damper motor, L1, L2 and GND (X) are the power connections. If power is there place a jumper between X and 2, or X and 3 to force the motor. This jumper bypasses the photohelic gauge and should cause the motor to turn. If it does not turn then the motor should be replaced.
Powder not transferring from cyclone dropout hopper.	Verify the reclaim switch is on. Verify the cyclone transfer airline from the collector is connected to the QD on the dropout leg. Check to see if transfer lines and pumps are clogged or plugged. Verify the inside of the dropout is not plugged by gloves, rags, etc. Verify the vibrator on the hopper is on.

Vortech Unit Troubleshooting Guide

Problems	Solutions
Photohelilc Gauge reading low or pressure does not change when set-points are adjusted.	Remove duct access panel to inspect damper blades. Verify that blades are moving when damper motor actuates. Make sure the Photohelic gauge is zeroed. Remove and inspect the final filters. If they are full of powder, there is a leak in the system around or in the cartridge filters. (Refer to above problems and fixes). Depending on the cartridge and final filter static pressure, it may be time to replace the filters.
Photohelic Gauge not actuating the damper.	Complete the above procedure for removing the blower access panel. Remove the cover on the photohelic gauge. With the control power on check to see if the gauge has power (120VAC) between L1 and ground. Verify running needle is between set-points. Voltage (20 vac) should be measured between gnd & orange & gnd & red in normal operation.If so, adjust the set-point needles below the running needle. Measure the voltage between ground and the red signal wire terminal (20VAC). Adjust both set-points above the running needle and check voltage between ground and orange signal wire (20VAC). Voltage should be measured on only one set of contacts at a time when adjusted above or below setpoints. If 20VAC is measured between orange and ground, ground and red should be 0. If voltage is read on both contacts at the same time, or not at all, the gauge needs replaced.
Damper blades installed backwards.	This requires visual inspection to verify blades are in the correct orientation. Make sure the disconnect is off as in the above examples. Remove the access plate on the duct and inspect the blades while they are being adjusted. When damper is 100% open the blades will be parallel to the airflow. As the damper closes the blades point in a "V" shape into the airflow. If the damper blades are not working correctly then disconnect the ductwork section closest to the blower housing to gain access to the damper blades and contact ITW Gema for drawings and assistance.
Motor overloads trip on initial startup.	New systems have no resistance to airflow from dirty filters. Motor overloads are preset according to motor and voltage specifications. Increase the overload set-point higher to allow the system to startup. Once the system has run and built up static on the filters the overload set-point should be set back to the original setting.

Vortech Spare Parts List

6K, 8K, 10K, 12K CYCLONE MODULE

127008	Cyclone inlet vane	
127009	Cyclone body	
126991	Aluminum door handle for removable cyclone door	
125928	Locking toggle clamp	
118784	Caster, swivel, 6” diameter	

6K, 8K, 10K, 12K TRANSFER HOPPER

119927	Gasket, Neoprene, 1.0” x .25 “ (specify the CFM when ordering)	
127013	Caster, Swivel, 3” with out brake	
127433	Clamp, toggle locking, Vortech hopper	

6K, 8K, 10K, 12K COLLECTOR SECTION

105176	Gasket, collector, 1.5” x 2” x 54”	
116870	Filter, cartridge, 23” x 13.84“, diam, 226 sq.ft. media	
126989	Cover, assy, filter support, Vortech	
118782	Knob, 3 lobe, Filter access cover	
118783	Gasket, cover, filter access	
109619	Filter, final, 24” x 19” x 3.5”	
125910	Solenoid valve enclosure, 4V, Vortech	(6000 CFM)
125911	Solenoid valve enclosure, 5V, Vortech	(8000 CFM)
125912	Solenoid valve enclosure 6V, Vortech	(10,000 CFM)
125913	Solenoid valve enclosure 8V, Vortech	(12,000 CFM)
118771	Valve kit, Solendoid rebuild, NEMA 4,3	
118772	Replacement coil, type qt (3 dz)	
118766	Valve, diaphragm, 1.50” , dia, Vortech	
121189	Diaphragm kit, dia., Vor, 1.5”	
119927	Gasket, neoprene, 1.0 x .25	

PULSEDOWN /transfer controls

125188	Valve, solenoid, 1/4”, continuous duty	
110765	PCB, timer, pulse-down, 6-pin	(6K, 8K, 10K CFM units)
125340	PCB, timer, pulse-down, 10 pin	(12K CFM unit)
122960	Regulator, pressure, 125 psi, 0.5” npt	
110540	Gauge, air, 0-100 psi 0.25npt, 2.5” dia., panel mount	
105820	Regulator, pressure, 0.375 npt, 0-60 psi	

BLOWER SECTION

125526	Gauge, phothelic, Vortech, 110 Vac
125491	Motor, damper control, Vortech
127215	Airflow element kit, fan inlet, 6K CFM
127218	Airflow element kit, fan inlet, 8K CFM
127129	Airflow element kit, fan inlet, 10K /12K CFM
125527	Coupling, shaft, Vortech, damper