

# Diamond Recovery System



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## Service Manual



MODEL  
6K, 8K, 10K, 12K, 14K, and 16K CFM

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February 2000 127516

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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 ⑤ 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 Diamond 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.



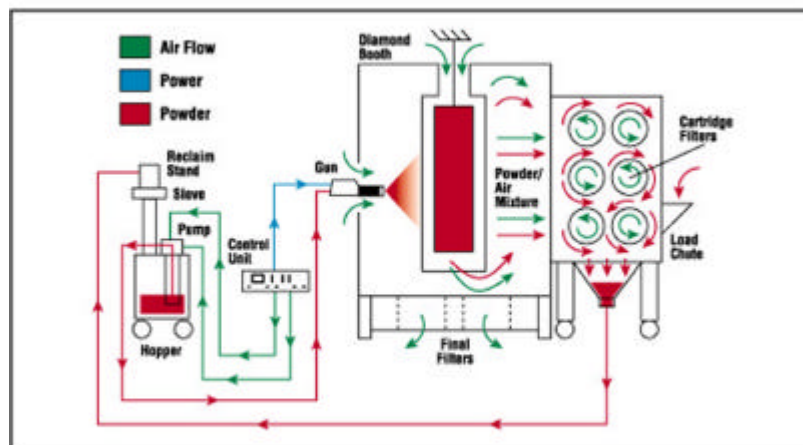
## Diamond Booth

The Diamond Booth is designed for conveyORIZED, high volume production lines that require a high quality finish and maximum powder recovery. Utilizing a compact, easily maneuvered cartridge collection system and a clear polycarbonate enclosure, the Diamond booth enhances the coating environment, taking full advantage of the transfer efficiency of the spray guns.

The clear, unclouded polycarbonate panels provide the best possible lighting for the application process. Complete visibility of the spray operation is available at all times, permitting visual monitoring of both manual and automatic gun performance. In addition, the enclosure material reduces the amount of powder that can build up on the booth walls, allowing more powder to be attracted to the part and minimizing clean up. Polycarbonate is an extremely hard material that resists abrasion and scratching. The Diamond Booth will not scratch as a result of routine contact with the powder and standard cleanup procedures. The hard, slick surface will stay smooth and easy to clean.

## Cartridge Collector

The cartridge collector assembly uses horizontally mounted filters easily accessed from outside the unit. It is mobile, and connected to the booth and exhauster by a single point clamping device that ensures a tight fit with minimal effort by the operator. Pressure drops through the filters are monitored constantly to maintain the utmost operating efficiency.



The cartridge filter design used in the Diamond Booth maximizes both the life and recovery performance of the filters. A unique dual media construction optimizes the filtering operation and delivers exceptional particle release properties during cleaning. In addition, the design of the cartridges provides maximum filtration at the lowest possible pressure drop. Together, these two features ensure longer filter life and provide the highest potential for powder recovery. This unique filter design also eliminates the need for “seasoning” the filters at startup.

## **Static Pressure Readings**

### **Collector Section**

Magnehelic Gauge / 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 relatively atmosphere so the **high port** on the magnehelic and the **P2 port** on the transducer are simply left open. (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.

### **Final Filter**

Magnehelic Gauge / Transducer – This device measures the static pressure in the final filter plenum. This is a 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. The **low port** on the magnehelic gauge and the **P1 port** on the transducer are simply left open. (Note: The extra high port should be plugged and the two low ports should be unplugged on the magnehelic gauge.)

## Setting the Pressure Switches for the Magnehelic Gauges

- 1 Set these pressure switches only while the system off.
- 2 Cut off a spare five foot piece of 1/4" tubing.
- 3 Plug it into the cartridge filter fitting on the back of the electrical panel.
- 4 Using a continuity meter, place it across the cartridge filter warning pressure switch terminals.
- 5 Suck on the tube slowly until you get continuity. The magnehelic should read "4.0". If you don't get the correct reading, remove the red cap and adjust the screw on the bottom of the pressure switch.
- 6 Perform the same procedure on the cartridge filter shut-down pressure switch until you reach "6.0" on the magnehelic.
- 7 Switch the 1/4" tube to the final filter connection.
- 8 Calibrate the final filter shutdown pressure switch to "3.5". Move to the final filter warning pressure switch and blow into the tube. Calibrate to "2.5".

Settings Table	Warning	Shut Down
Cartridge	4.0"	6.0"
Filter	2.5"	3.5"

**Set-**

## ting Pulse-Down Timer

- 1 Insure the regulated air pressure to the blower is between 50 – 70 psi. (Note: 90 psi is the maximum pressure the cartridge filters can withstand.)
- 2 Inside the blower housing, remove the cover of the timer box.
- 3 "On" time is the amount of time air is sent through filters. Typical setting .1 seconds.
- 4 "OFF" time is the amount of time between pulses. Typical setting is 13 seconds.
- 5 Insure that the jumper is set to the same number as there are sets of collector filters.

**CAUTION:** Adjusting the pulse down pneumatic circuit different than recommended settings may result in sporadic operation of the collector / blower system. This may lead to premature filter failure or nuisance shutdown caused by dirty filters.

Air gauges

### **Collector Transfer Pumps**

Controls for the collector transfer pumps are pre-plumbed and mounted in the blower section. For the collector transfer pumps a coupling is mounted to the collector. From there, airlines are teed and run to the individual transfer pumps. Regulator settings should be set to achieve adequate powder transfer based on transfer hose length. Excessive air pressure can cause powder impact fusion and reclaim problems.

### **Collector Fluidizing Plate**

Controls for the collector fluidizing plate are pre-plumbed and mounted in the blower section. For the collector fluidizing plate, a coupling is mounted to the collector. From there, airlines are T'ed to the plenum inlet fittings. Regulator settings should be set to achieve "simmering" powder. The fluidization in this unit is designed to move powder for transfer only. Perfect fluidization is not required.

### **Prewire / Pre-plumb Requirements**

#### **Electrical Requirements**

Exhaust Power Cable Assembly for:

- Blower motor

Five Pole QD Cable for:

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

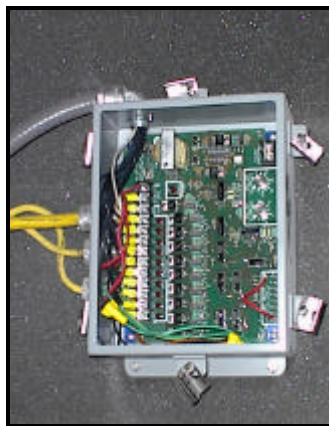
#### **Air Requirements**

1/4 inch tubing for:

- Collector Pressure Reading.
- Final Filter Pressure Reading.

3/4 inch Supply Airline from Booth Manifold for:

- Pulse Down Regulator.
- Fluidizing plate Regulator.
- Collector Transfer Pump Regulator.



Pulse down / Transfer control board

## **Standard Diamond Components**

### **Cartridge filter section**

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

### **Blower Housing**

- Fan wheel
- Inlet cone
- Inlet damper
- Fan motor
- Final Filter Plenum & Filters

## **System Performance Variables**

# Diamond Booth Airflow Calculation Sheet

This sheet contains formulas for calculating system airflow 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. All measurements should be taken at the same depth into the opening for consistent readings. 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	
A	
B	
C	
AVG.	

GUNSLOT 4	
A	
B	
C	
AVG.	

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

CFM: \_\_\_\_\_

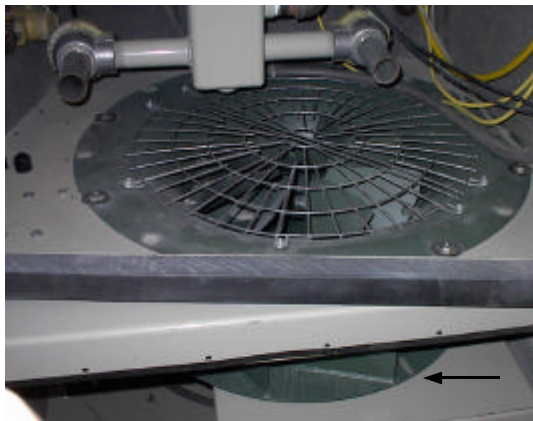
Booth CFM: \_\_\_\_\_

### **Collector**

- Cartridge Filters are tightened. - Must be tightened or powder will pass through seals 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 (13-15 sec off / 0.1sec on, 50 –70, 65 suggested).
- Verify cartridge filter and final filter static pressure readings are correct.
- Collector powder level. - Can not build up higher than the booth floor. Excessive powder build up in the collector can get airborne and shorten the cartridge filter life.

### **Blower Section**

- Damper operating correctly.
- Fan wheel is rotating in the proper direction. Looking down from the pulsedown section of the blower at the fan wheel, the rotation is clockwise.
- Pulsedown valves operating correctly



Fan clockwise direction

## Diamond Troubleshooting Guide

<b>Problems</b>	<b>Solutions</b>
Powder not transferring from collector	Assure there is compressed air going to the transfer pump. Check transfer pump regulator setting. Check for worn pump insert, check for obstruction in transfer hose or pump. Check fluidization.
Poor fluidization in collector.	Powder level too low (minimum 6 inches necessary for proper fluidization). Check and adjust fluidization air. Check for proper installation of fluid plate (if installed upside down would cause a problem).
Powder floats out of booth.	Cartridge filters may be plugged. Pulse down pressure may be set too low (should be 50-70 psi). Check for faulty pulse down valve or improper pulse down settings. Check fan for correct running direction. Check damper adjustment. Verify compressed air quality.
Powder leaking past the cartridge filters causing the final filters to blind	Check collector seal to frame, replace if damaged. Tighten all nuts on the clean side. Cartridge filter cover plates should be tightened down until the knob bottoms out on the threads.
Final filter static pressure raises to shutdown level	Filters may be plugged and need to be cleaned or replaced. Verify the reading is correct with another gauge. If filters are plugged, see above and connect any gasket or mounting problems.
Cartridge filter magnehelic gauge does not read correctly.	Callibrate the gauge (readjust to zero with system off). Verify that the reading is good by using another gauge. If readings are the same, powder may be plugging up the pressure "T" tube inside the collector, or there could be a leak in the tube. Blow out the lines and inspect the "T" tube. Run a parallel "test" tube and check all fittings for leaks. Contact the ITW Gema service department before making any relocation changes.

# **Diamond Spare Parts List**

## **COLLECTOR SECTION**

- #105176 - Gasket, 2 inches wide X 1.5 inches thick W/PSA
- #118779 - Rubber Edge Trim
- #116870 - Filter Element, Diamond Collector
- #118653 - Fluidizing Plate, 6,8,10,12,14,16 K Collectors
- #118781 - Cover Knob Assy, Gema, DIAMOND
- #118782 - Knob, 3 Lobe, DIAMOND Collector
- #118783 - Filter Access Cover Gasket
- #118784 - Castor, Swivel, 6 inches Diameter, DIAMOND Collector
- #118785 - Powder Chute Assy, DIAMOND Collector
- #120604 - Gasket, Collector, 1.5 inch X 3 inch X 37.25 inch, 6K
- #120605 - Gasket, Coll., 1.5 X 3 inch X 57.25 inch, 8&10K
- #120606 - Gasket, Coll., 1.5 X 3 inch X 77.25 inch, 12K
- #120607 - Gasket, Coll., 1.5 X 3 inch X 97.25 inch, 14&16K

## **BLOWER SECTION**

- #118766 - Valve, Pulsedown, 1.5 inches
- #121189 - Diaphragm Kit, for 1.5 inch valve
- #118771 - Solenoid valve rebuild kit, NEMA 4
- #118772 - Replacement coil, Type QT
- #118767 - Enclosure, Solenoid, 4 Valve
- #118768 - Enclosure, Solenoid, 6 Valve
- #118769 - Enclosure, Solenoid, 8 Valve
- #118770 - Enclosure, Solenoid, 10 Valve
- #125188 - Valve, Solenoid, 1/4 inch, Continuous Duty
- #110765 - PCB, Timer, Pulse Down, 6 Pin
- #125340 - PCB, Timer, Pulse Down, 10 Pin
- #122960 - Regulator, Pressure, 125 PSI, 0.5" NPT
- #110540 - Gauge, Air, 0-100 PSI 0.25NPT, 2.5" diameter., Panel Mount
- #105820 - Regulator, Pressure, 0.375 NPT, 0-60 PSI
- #109619 - Filter, Final, 24" X 19" X 3.5"

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Printed in Indianapolis, Indiana