Electrostatic Precipitator (ESP)

Operational Manual

For Model:

DGRH-K-3500K



DGRH-K-2-3500K



Contents

1 **Instruction for Use** ---------- 2
1.1 Safety Requirement 2

2 **Equipment Instruction** ---------- 3
2.1 Product Overview 3
2.2 Features 3
2.3 Operating Principles 3
2.4 Technical Parameter 6
2.5 Maintenance space 6
2.6 Environmental requirement 7

3 **Structure Introduction** ---------- 7
3.1 ESP Unit Main Components 7
3.2 Installation environment 8

4 **Equipment commissioning** ---------- 10
4.1 Inspection before switch on 10
4.2 Check Power Supply 10
4.3 Equipment commissioning 10

5 **Operation** ---------- 10
5.1 Switch & Indicator Light Information 10
5.2 Regular operation 11
5.3 Caution 11
5.4 Maintenance 11
5.4.1 Maintenance Schedule 11
5.4.2 Maintenance Requirement 11
5.4.3 Clean Collector Cell 11

6 **Trouble shooting** ---------- 12

7 **Unpacking, handling and Storage** ---------- 13
7.1 Unpacking and handling 13
7.2 Storage 13

8 **Others**
8.1 Warranty Card 14
8.2 ESP Daily Inspection Records 15
8.3 ESP Weekly Inspection Records 16

1

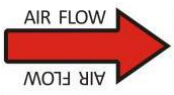
Instruction for Use

Thank you for purchasing our product! In order to ensure safety and service life of the equipment, please follow operation manual strictly!

⚠Caution
(1) This unit must be installed by professional, well trained and authorized personnel. (2) This manual covers the unit mentioned on DGRH-K series models. (3) All rights reserved on this publication. Without prior written permission of manufacturer, any plagiarism or adaptation of this manual in whole or in part is a serious infringement.
⚠Statement
User must follow operation manual strictly to maintain, clean and install the units. The user should arrange personnel to take charge of equipment management, operation and maintenance after training, so as to ensure the equipment is in normal operation. The user shall be responsible for the loss caused by non-observance instructions in this manual.
This series of units meet the standards ISO 9001:2015 CE RoHS

1.1 Safety Requirement

The related information to personal safety and equipment property in the manual are displayed with the identification key. When the symbols appears, it must be read and understood the related precautions. The symbols are as follows:

	**WARNING!** Indicates the warn of a risk of personal injury and electric shock!
	**CAUTION UV LIGHT** Do not look directly at UV light. UV radiation is harmful to eyes, risk of losing sight and may burn the skin and eyes.
	**CAUTION UV LIGHT** Eye protection required. UV-protection glasses must be worn during unit maintenance, while UV light is illuminated.
	**AIR FLOW** It must be installed in strictly accordance with the direction of air flow, otherwise it will affect performance!

2 Equipment Instruction

2.1 Product Overview

Electrostatic precipitators (ESP) are applied for air filtering cooking fume from commercial kitchens.

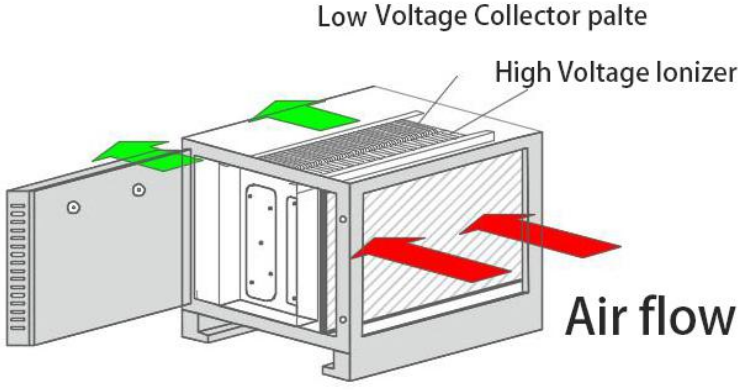
There are various specific features to suit this kitchen cooking fume control and industrial application. In case of industrial application, please contact manufacturer for written permission. Or warranty is not covered the damage or injury from non-intended use.

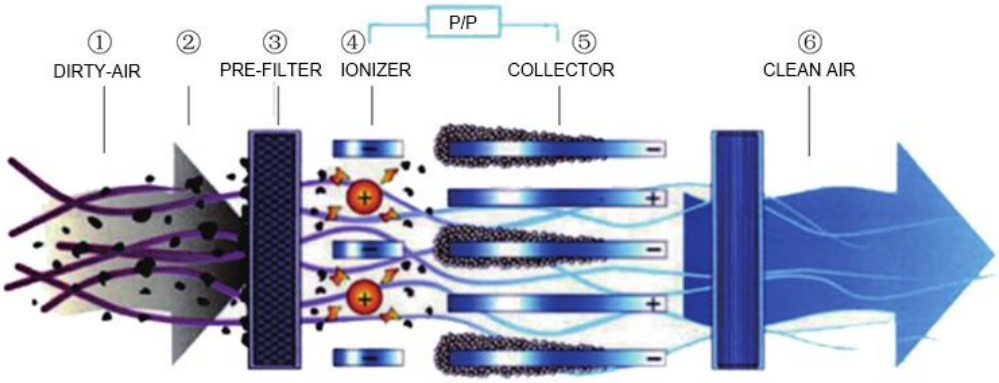
2.2 Features:

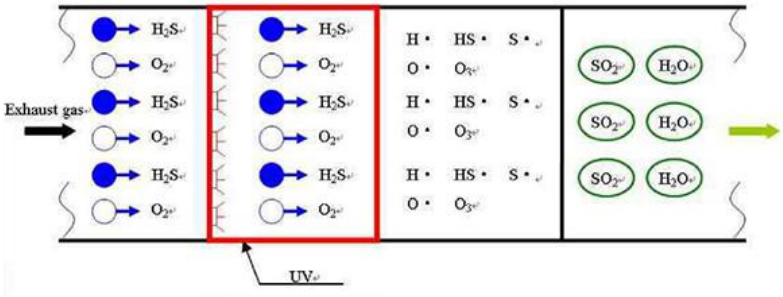
1. Kitchen odor, smoke, oil control efficiently
2. High fume removal efficiency rate: 90-93% or >98% (efficiency stacking units)
3. Flexible/customized modular design:
   (1) Easy installation, maintenance and cleaning.
   (2) Modular units are allowed to vertical/horizontal stacking combination as per different air flow or removal efficiency rate request.
   (3) Collector cell, mesh filter and oil sump are easy to remove and clean.
4. Intelligent electrostatic power control system.
   Electric intensity auto-control function ensures the unit maintains a high removal efficiency rate after a long time service.
5. Safety and Stability:
   Door-open power-off protection; over-current, voltage, temperature protection; regular discharge protection & electric arc protection; high voltage open circuit and short circuit protection.
6. Powder coated carbon steel cabinet.
   The unit can be installed in outdoor without shelter housing.
7. Photolysis and odor removal (DGRH-K-U models only):
   High power UV tube will remove food odor more efficiently.
8. When unit is running, ozone will be produced to eliminate odour.
9. Cost effective & eco-friendly:

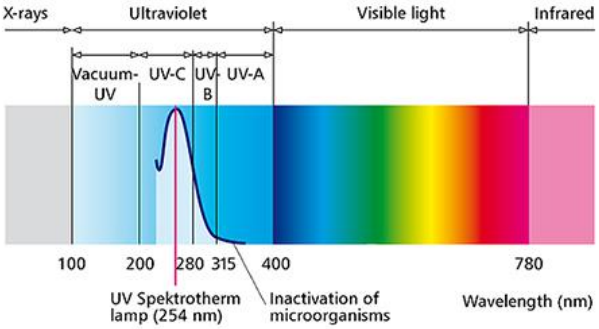
Long life-span, minimum maintenance, energy saving and small in size.

2.3 Operating Principles









Fume control is composed of two parts:

(1) Cooking oil, fume and grease particles part.

- The dirty air passes through a mesh filter. Most of big size of oil, fume and grease particles are removed.
- The air passes into the high voltage Ionizer section where charges even microscopic contaminants (Small to 0.01mm size) to a positive potential.
-The positive ionized air then passes through low voltage aluminum collector plates. The plates will capture them magnetically from air stream and stick them.
- The particulates will drain down into oil sump.
- Clean air exits through the unit.

(2) UV Photolysis Odour Removal part.

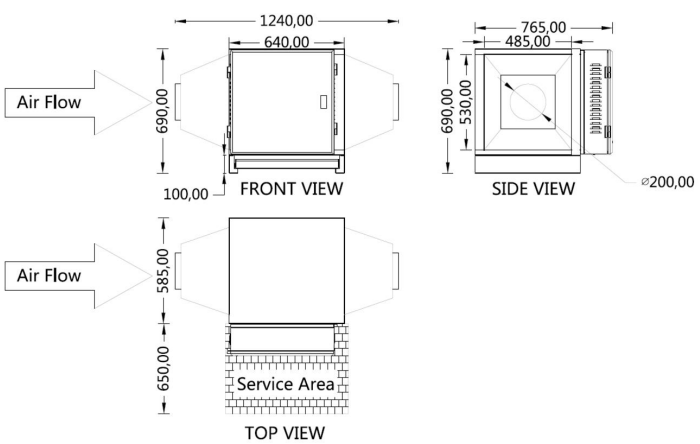
Ozone is produced in the collector cell. Besides, UV-C ultraviolet tube (wave 254nm) also produces OZONE and undergoes chemical processes such as photolysis and ozonolysis that breaks down grease and odour containing compounds produced during cooking. And then it releases CO_2, SO_2, H_2O and small amount of powder.

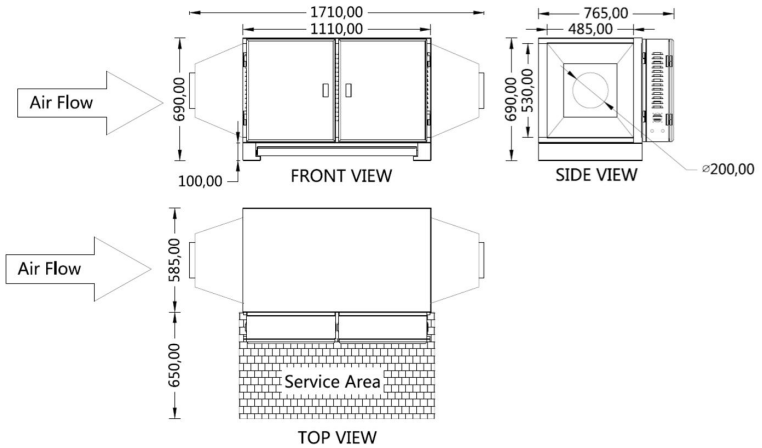
Note: High efficient Activated Carbon Odor Extractor unit are also available to extend odour control performance.

2.4 Technical Parameter

Model	DGRH-K-3500K	DGRH-K-2-3500K
Air Flow (M³/H)	3000-3500	
Cabinet material	Powder-Coated Galvanized Steel (1.2mm)	
Cabinet Size L*W*H (MM)	1240*765*690	1710*765*690
Flange Size W*H (MM)	diameter 150	
Removal Efficiency Rate	92-97% @ 3000 CMH (Tested by ASHRAE 52.2-2017)	
Wind Resistance (PA)	39	45
UV-C Tube Qty (PCS)	Without / 2 pcs (option: 40W/pcs)	
Power Pack Qty (PCS)	1	2
Power Consumption (Watt)	110	220
Power Pack	High-frequency High-Voltage Solid-state Transformer	
Power Suply	220V / 1 PH / 50~60 HZ	
ESP Air Flow Direction	left to right or right to left / reversible	
Each Cell Size L*W*H (MM)	537*320*515	
Ionizer blade (Qty/cell)	8	8
Collector plate (Qty/cell)	49	
Collector plate thickness (mm)	1	
Cell Net Weight (kg/cell)	18.5	
Cell Qty (PCS)	1	2
Ionizing / Voltage (KV)	Stainless Steel / 12-14	
Collection Plate / Voltage (KV)	Anti-corrosion Aluminum / 6-7	
Particle Size	Collects Particles As Small As 0.01 Microns	
Effective Collection Area	4.655 sqm/cell	
Indicators	LED Lights For Power And Fault Indications	
Insulator Material	Ceramic	
Net Wight (KG)	75	124
Installation	Ceiling Suspended or Wall Mounted	
Maintenance Space (mm)	650	

2.5 Maintenance Space (650mm)





2.6 Environment requirement

A. Working temperature: -10~60 ℃

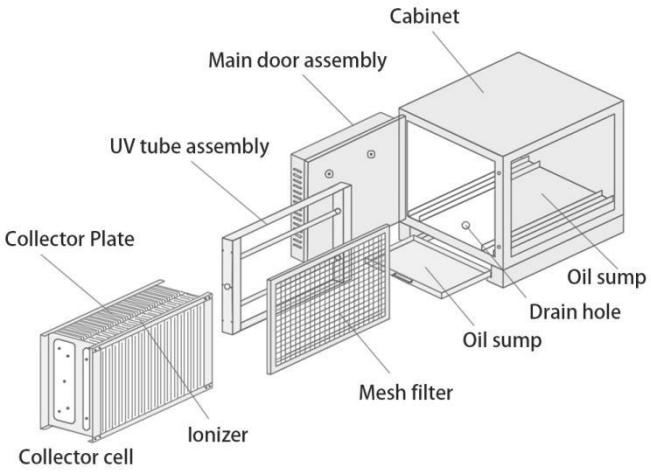
B. Ambient humidity: 20-90%

C. Suitable gas: non-inflammable, non-explosive, non-volatile, non-highly corrosive gas

3 Structure Introduction

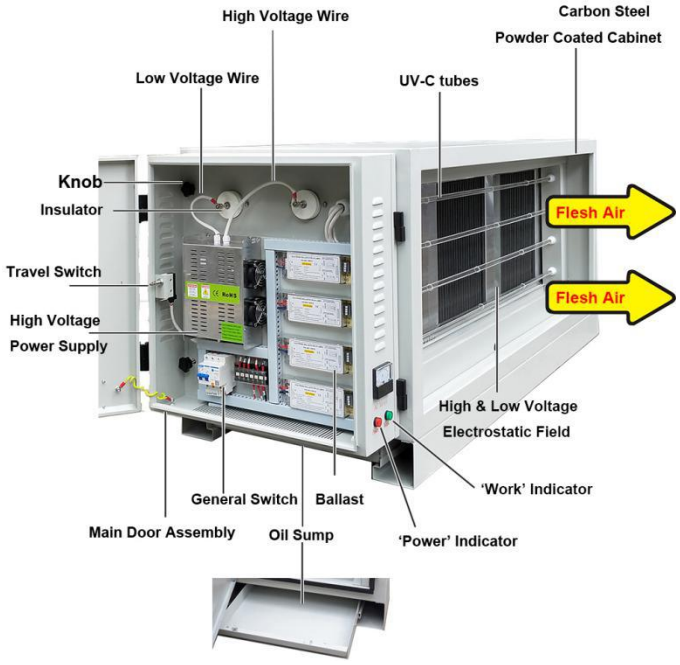
3.1 Electrostatic Precipitator (ESP) Unit Main Components.

All ESP models contain removable main door assembly (includes power supply system), collector cell (Collector plate & Ionizer), mesh filter, oil sump and cabinet. UV tube assembly is for DGRH-K-U models only. In case of models without UV tube assembly, there are mesh filters on both sides.



Electrostatic Precipitator Unit Main Components

Main door assembly contains high voltage power supply and electrical control elements. Turn the knob anti-clockwise, and then access door can be open.



3.2 Installation environment

1. Ensure whether all the components of ESP are complete or not before installation. If the main components were deformed or damage during transportation, please repair them.
2. Ensure the unit if there is any component missing or forget tools inside, please remove them.
3. The weight of the duct ventilation pipe should not be added to the unit.
4. Ensure adequate maintaining space in the front of the unit as per specification list.
5. Match the main power cord to 220VAC 50HZ , and then connect the ground wire.
6. For ceiling mounted unit, there must be a maintenance platform in the front of the unit
7. Ensure the safety main switch and micro-switch are running normally.
8. Ensure the function of indicators and switches are running normally.
9. The unit is very heavy. Remove all the single or multiple collector cells, mesh filters and oil sumps and place them in a safe area before installation. In this case, a lot of weight of unit will be reduce. When the unit was installed, replace them into the unit.









4 Equipment commissioning

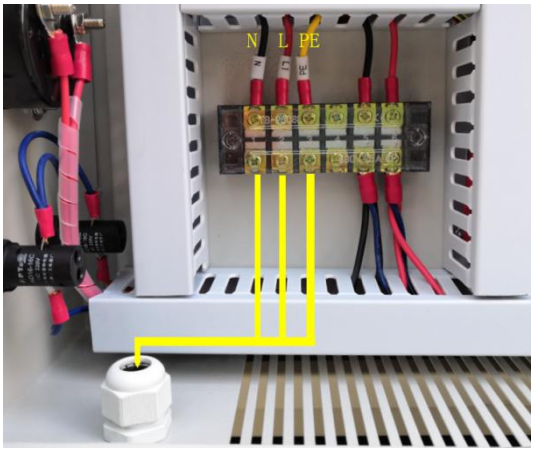
4.1 Inspection before switch on

Check Technical Installation Requirements item by item carefully. If requirements can't be met, please rectify them until they are qualified. Before switching on, please ensure that all accessories are installed correctly and firmly

4.2 Check Power Supply

Before switching on, check the power supply system by voltmeter and ensure parameters are in compliance with the metal rating plate mounted on the main door. Ensure electrical ground/earth is proper, reliable and less than 2 Ω .

There are wire symbol ring on wire (**L** is a live wire, **N** is a zero wire and **PE** is ground/earth wire) as shown in Figure 4-1. User prepares his own wire (diameter: 10mm) and connects it to the unit.

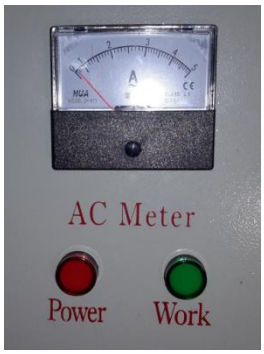


4.3 Equipment commissioning

Please operate the unit as per chapter 5. Ensure all the indicators works normally. In case of any problem, please solve it as per Trouble Shooting.

5 Operation

5.1 Switch & Indicator Light Information





Main Power Switch: Switch on	Red LED light: Illumination means the	Green LED light: Illumination means the unit

	unit is power on.	is running.

5.2 Regular operation

A. Switch on the unit, the green LED light illuminates.
B. When the maintaining door open, the unit stop working automatically, then switch off the unit and closed the door.

5.3 Caution

 **Caution**
Warning of internal live high voltage, user must switch off main power before any maintaining or cleaning.

5.4 Maintenance

In order to ensure long-term stable operation and high removal efficiency, user must maintain and clean the unit periodically.

5.4.1 Maintenance Schedule

Schedule	Maintain Items
Every day	1. Keep the surroundings of unit clean. 2. Ensure oil can't spill from oil sump and clean it. 3. Ensure if the main switch is on or not.
Every month	1. Clean the collector cell 2. Clean the oil in the unit

5.4.2 Maintenance Requirement

 **Important Note**
Operators must wear protective glasses, gloves to prevent alkaline liquids injury from the skin.

5.4.3 Clean Collector Cell

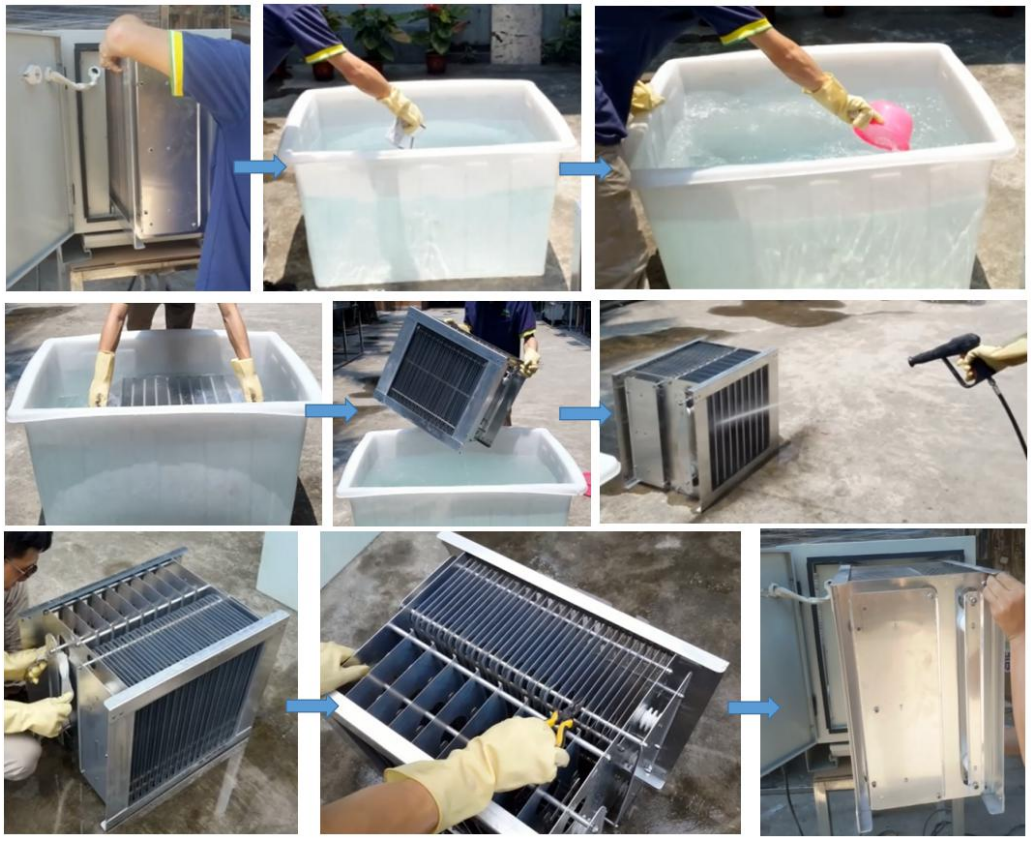
1) Prepare tools:

high pressure water gun, goggles, plastic gloves, screwdrivers, protective glasses, caustic soda, water tank, nipper pliers.

2) Clean the collector cell

A. Switch off the unit and take out the collector cell carefully.
B. Fill warm water (50-70℃) in water tank, and then pour 1:20 caustic soda in water. Stir water with a stirrer.
C. After the caustic soda are completely melted, put collector cell in water tank not more than 20 minutes. Lift the cell up and down every 2 minutes.
D. Take out collector cell and place it on a clean ground after caustic soda mixed solution was drained away.
E. Spray all the collector cell with a high pressure water gun. Remove grease and residual dirt from each insulators and spray it.

F. After the collector cell dries completely , ensure it is completely clean.



3) Attention

A. The container should be made of stainless steel or plastic for the collector cell. Its volume must be larger than the collector cell. Besides, it must be strong acid and alkali resistant.

B. The electrical power supply must be switched off before maintenance to ensure safety of the cleaning personnel. If the unit is remote from electrical power supply, hang out a warning sign 'Do Not Switch On'.

C. Open access door and discharge the collector cell.

D. Caustic soda is used in the process of cleaning collector cell. It has slight corrosion and pungent odor. Please wear plastic gloves and protective glasses in advance.

E. After the single collector cell dries naturally, replace it in the cabinet and pay attention to air flow direction.
If the collector cell is more than a single unit, make sure the spring on the collector cell is not displacement before replacing. Replace the collector cells one by one and make sure the spring will connect with each other properly and pay attention to the direction of the air flow.

F. Replace the collector cell carefully. Do not damage any components of the collector cell.

G. Switch on electrical power supply and general switch, secure maintenance door. The unit will start running.

6 Trouble shooting

If the unit does not perform function correctly, please solve the problem as per below checklist.

Problem	Possible Cause	Solution
Crack sound in the unit and the green LED light is not illuminated.	1. There is metal debris inside which could cause the short circuit of the collector cell. 2. The ionizer blade is not straight or bent, and the aluminum collector plate is deformed. 3. The collector cell is too close to the hood. It causes excessive water vapor or fire from the stove. 4. Collector cell is too dirty for a long time. 5. Incorrect cell position causes short-circuiting. 6. Collector cell does not dry completely after cleaning	1. Clean it 2. Repair ionizer and collector plates by nipper pliers. 3. Keep proper distance from the hood. 4. Clean the collector cell 5. Check and correct its position. 6. Turn on exhaust fan for 1 hour. Let it dry completely
The red and green LED lights are not illuminated.	1. The input cable is not connected or the unit is defective. 2. The general power switch is damaged.	1. Check the wiring connection. 2. Replace a general switch.
The red LED light is illuminated, but the green LED light doesn't work.	1. The general power switch is damaged. 2. High Voltage Power Supply (HVPS) is damage	1. Replace a general switch. 2. Replace a HVPS.
Insufficient removal efficiency capacity	1. The collector cell and mesh filter are too dirty for a long time. 2. Arcing in the cell 3. Power supply does not function well. 4. A breach in the ducting	1. Clean the collector cell and pre-filter 2. Check the collector cell and clean it 3. Check the power supply 4. Check and repair

7 Unpacking, handling and Storage

7.1 Unpacking and handling

Open the wooden case and wrapping by trained, professional person.

7.2 Storage

The unit must be lifted with care. User must observe handling practices to avoid personal injury or damage to the unit. The equipment should be stored in a dry, ventilated environment. It should not be placed in high temperature, humidity, or corrosive gases place, such as acids and alkalis.

Each unit comes with the following:

Main door Assembly, collector cell, mesh filter, manual.

Warranty Card

User Name		Telephone	
Address:			
Model No.		Production No.	
Maintenance record 1			
Maintenance Person		Date	
Problem		Solution	
Maintenance record 2			
Maintenance Person		Date	
Problem		Solution	
Maintenance record 3			
Maintenance Person		Date	
Problem		Solution	

1. If there are quality problems, the user need to show the warranty card. Warranty covers one year.

2. Warranty covers the scope: electrostatic control system, insulator, collector cell.

3. Warranty does not cover:

3.1. User did not clean and maintain the unit in accordance with the regular maintenance procedures, resulting in unit defective or failure of the high voltage generator voltage output.

3.2. User modified the unit without written permission in this manual or authorized professional person.

3.3. Improper installation which fails to meet the standard mentioned in manual and result damage to the unit.

When the unit is too closed to stove, high-low voltage electrostatic integrated board is damaged due to the fire entering the unit.

3.4. Repair/install the unit without authorized, well trained, qualified person.

3.5. Damage due to improper operation, transit, delivery and irresistible factors.

3.6. Defects only affects appearance of the unit.

3.7. Application is not mentioned in this manual or writing permission by manufacturer.

3.8. The purchased date exceeds the warranty period.

3.9. Without "Product Warranty Card."

Stamp:

ESP Daily Inspection Records

Inspection Person：_____ Date _____

Inspect items / Date	Surface of the unit	Oil sump is full or not	Fume temperature is over 70℃ or not	LED Indicator is normal or not	Air leakage of the unit or ducting	Remark
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Normal--O Abnormal--×

If there is any abnormality, please make a record and handle it in time.

ESP Weekly Inspection Records

Inspect items / Date		Collector cell cleaning	Cleaning debris	Cleaning insulators	Unit Internal oil cleaning	Year _____ Inspection person	Commissio-ning record
January	15th						
	30th						
February	15th						
	28th						
March	15th						
	30th						
April	15th						
	30th						
May	15th						
	30th						
June	15th						
	30th						
July	15th						
	30th						
August	15th						
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September	15th						
	30th						
October	15th						
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November	15th						
	30th						
December	15th						
	30th						

Normal -- O Abnormal --×