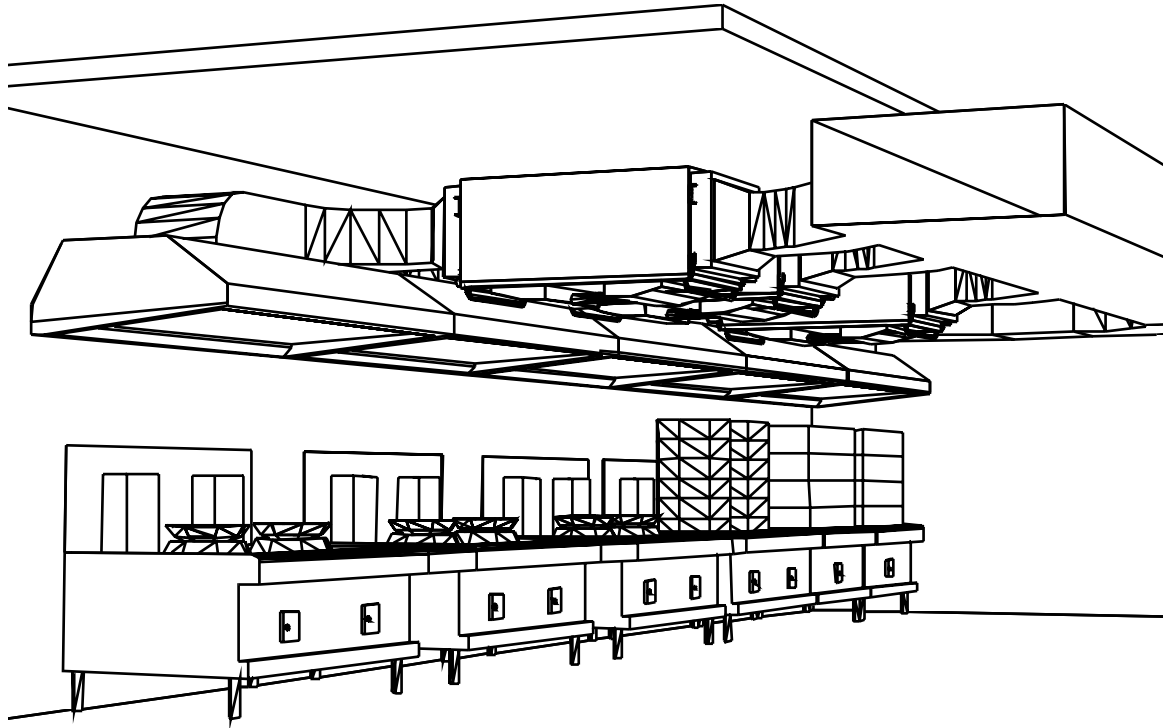


12/2021

Mod: SFS/60-75

Production code: 700010



F U O
Super Intelligent Electrostatic Precipitator

Foreword

Thank you very much for your trust on FUO Super Intelligent ESP. In order to install and operate the ESP, please read this manual carefully.

This manual makes the full illustration on the operation and maintenance.



Special Explanation

- 1) This manual is written for the standard model of FUO Super Intelligent.
- 2) For the content of the manual, if there is any change on the product size based on the improvement, no other notice will be informed.
- 3) If there is any point that user can't understand, please contact the manufacturer and advise the production code on the nameplate and the manual No. on the bottom right-hand corner of the manual.



Special Announcement

User should choose the appropriate model to install and operate the ESP according to the manual, and have the qualified and trained personnel to manage and maintain the ESP to keep it work in a normal condition. If there is any losing because of the incorrect operation and maintenance, manufacturer will not be responsible for the loss.

The products meet the standards:

CE Security Certificate
ISO9001:2000 Certificate

Security Symbol

When the information in this manual related to the security and property will be emphasized by the symbols. When there is symbol, please read the related notes. The symbols will be as followings:



Danger

The appointed harm will cause the loss of property and damage on person!



Requirement

User should follow the requirements strictly, or it will affect the security of the person and equipment!



Remind

User should pay more attention and more clarification should be addressed!

Contents

1	Introduction	1
1.1	Purpose	1
1.2	Basic Features	1
1.3	Parameters	1
1.4	Environmental requirements	1
2	Structure	2
2.1	Electrostatic Precipitator	2
2.2	Water-heating Auto-clean Tank	3
2.3	Working Theory	4
3	Installation	4
3.1	General Installation Guide	4
3.2	Evaluation of Location for Installation	5
3.3	ESP Mainframe Installation	6
3.4	Water-heating Auto-clean Kit Installation	6
3.5	Connecting air Duct	7
3.6	Notes	7
4	Equipment Debugging	8
4.1	Inspection before Application	8
4.2	Power Inspection	8
4.3	Adjust Airflow	8
4.4	Commissioning	8
5	Equipment Operation	9
5.1	Panel Introduction	9
5.2	Operation Guide	10
5.3	Caution	11
6	Maintenance	12
6.1	Schedule for Maintenance	12
6.2	Maintenance Guide	12
7	Trouble Shooting	16
7.1	Malfunction and Management Method	16
7.2	Caution	17
8.	Other	17
8.1	Unpacking	17
8.2	Transportation and Store	17

1 Introduction

1.1 Purpose

Electrostatic Precipitator is an appropriate set to remove the oil mist produced during the cooking processes inside a kitchen. It can be fixed in kitchens where there are frying stoves, deep-frying stoves and BBQ ovens in the kitchen, and also can be fixed in kitchens where there are heavy duty griddles and so on. Processed cooking fume must be exhausted into well-ventilated open areas. Do not use the catering electrostatic precipitator to purify the industrial oil mist which is normally combustible, corrosive or explosive.

1.2 Basic Features

- ※ High Efficiency in electrostatic precipitation of cooking fume and oil mist. Nice performance in deodorization
- ※ User friendly instruction, malfunction self-diagnosing system, ensuring easy operation and maintenance for users.
- ※ Modular design, ensuring easy assembly of our Electrostatic Precipitator for total operation and easy removal of the electric fields and other major components for maintenance and cleaning.

1.3 Parameters

A. Series: Super Van, Super Clean, Super Intelligent Series

B. Features

Ambient Environment for the Emission of processed air	Series
High altitude emission or low altitude emission while the exhaust outlet is located far from the commercial or residential areas	Super Van Series
Low altitude emission	Super Clean, Super Intelligent Series

C. Purification Efficiency: (rated airflow at 60℃)

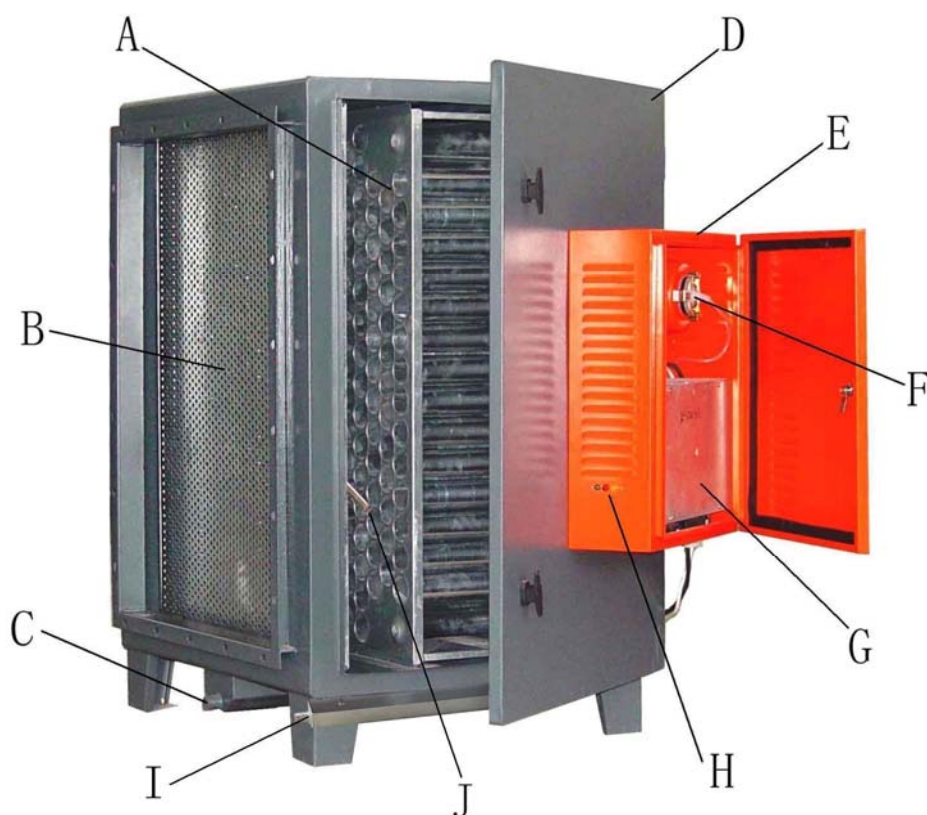
Series	Super Van	Super Clean & Super Intelligent
Efficiency	≥85%	≥95%

1.4 Environmental Requirements

1. Temperature: +10~+40℃
2. Humidity: 20~90%
3. Height above sea level: <1000M
4. Temperature of the fume: <70℃ (keep the system away from combustible, corrosive or explosive environment)

2 Structure

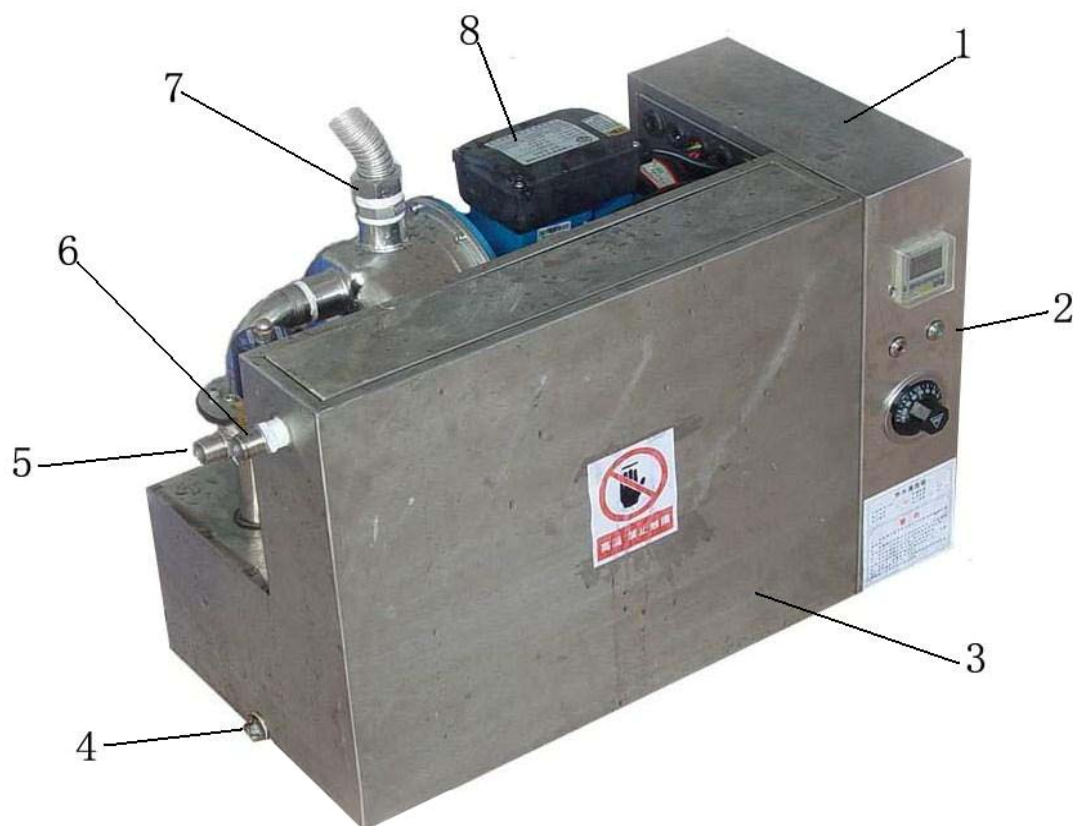
2.1 Electrostatic precipitator



2.1.1 Illustration of structure

Mark	Description	Function
A	Electric Field	Purify cooking fume
B	Air flow divider	Insulate the bigger particles; have the flow go into the electric field evenly to guarantee the purification effect.
C	Drainage Outlet	Discharge the grease collected by the EF, and sewage which clean the EF
D	Door of the Electric Field	Open to inspect the operation status of the electric field
E	Power Box	With built-in High voltage Controller Units
F	Bus with Insulator	Output high voltage to the electric filed
G	High voltage Switch Power Supply	Patented high-voltage switching power supply
H	LED Panel	Display the working condition of the electric field.
I	Water sink	To disposal of water leaking out of the electric field while cleaning
J	Rotatable bar with spaying nozzles	Spray water to clean the electric field

2.2 Water heating auto-clean tank



Model: BS-20L

2.2.1 Illustration of structure

Mark	Description	Function
1	Control box	Control the procedure of the auto-cleaning process
2	Control Panel	Display the status of the water-heating cleaning tank Adjust the temperature and start/stop the auto-cleaning function
3	Storage tank	For the storage of water fed by the water source
4	Drainage Outlet	Drain out water in the tank
5	Water inlet	Feed the tank with water coming from the source (1½")
6	Overflow vent	Discharge excessive water to avoid overflow (¾")
7	Water delivering outlet	Connected to the rotatable bar with spraying nozzles to clean electric filed (1")
8	Water pump	Pump water from the storage tank into the electric filed

2.3 Working Theory

Indicated in Figure 3-1, under the pressure of the suction fan, oil-laden exhaust air enters the ESP, oil mist and grease droplets gets captured by electric fields and precipitated on the inner surface of the anode tubes, and which can achieve the purification effect. The grease and dust caught by the electric field accumulate on the inside of the anode plate, which will be gathered in the grease slot for recycle.

3 Installation

3.1 General Installation Guide

Floor Installation Way:

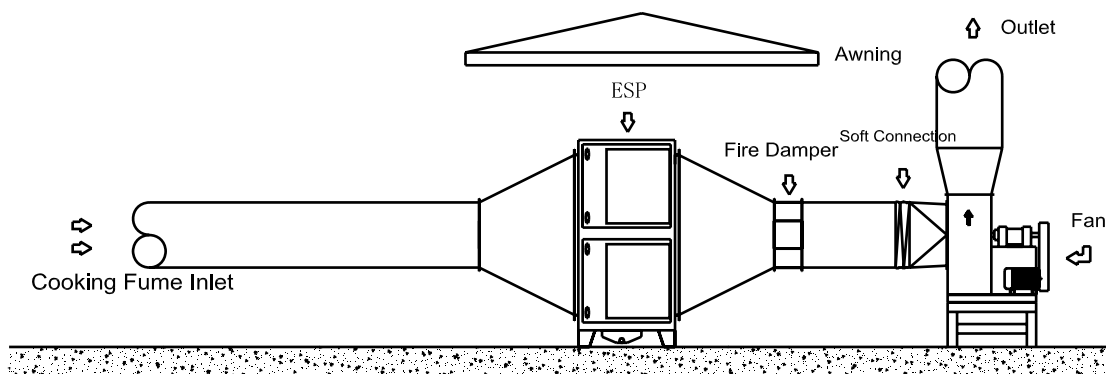


Figure 3-1

Hoisting Way: (applicable for small size)

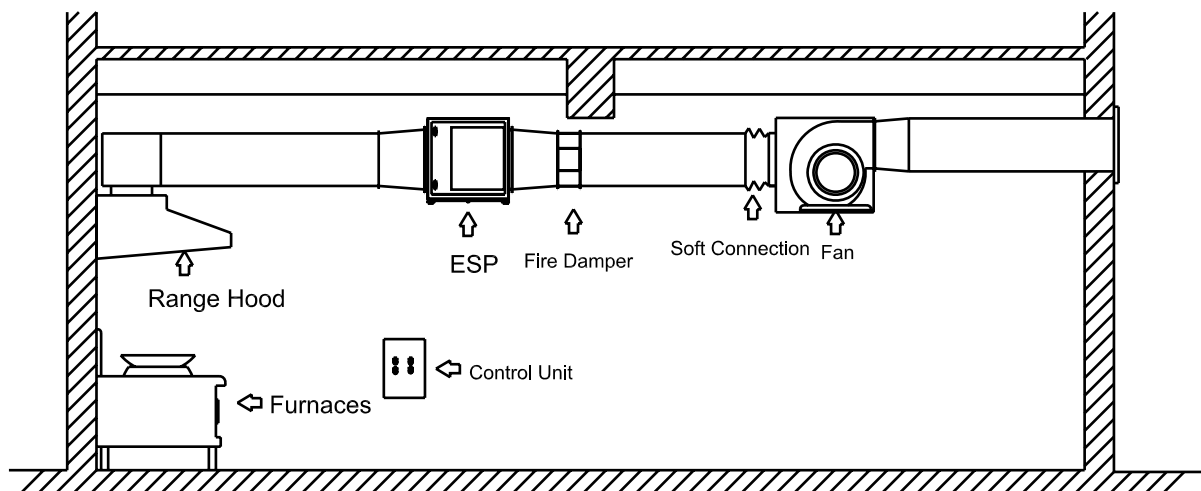


Figure 3-2



Requirement

✓ To guarantee the security of the equipment, users are advised to install fire dampers at both ends of the electrostatic precipitator, and keep maintaining and checking them regularly.

3.2 Evaluation of location for installation

The installation location should meet the following requirements:

- ※ The floor should be level;
- ※ The intensity of the floor or ground can bear the weight of the equipment;
- ※ There should be enough repairing room between the side of the overhaul door and other objects, the overhaul room should be ≥ 1 meter (Figure 3-3) ;
- ※ The temperature of the cooking fume entering in to the equipment should be under 70°C .

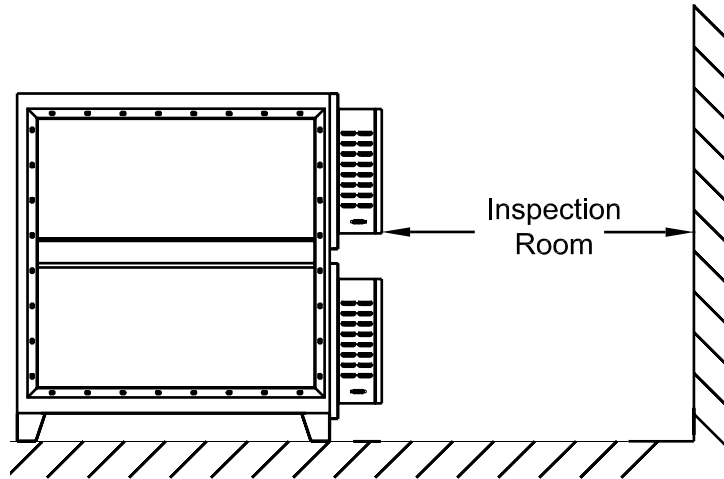


Figure 3-3

In kitchens, there are stir-frying stoves and deep-frying stoves producing cooking fume and oil mist, there are also steamers and soup stoves that only produce heat and steam, which will not need to be processed by ESP so as to reduce the cost.

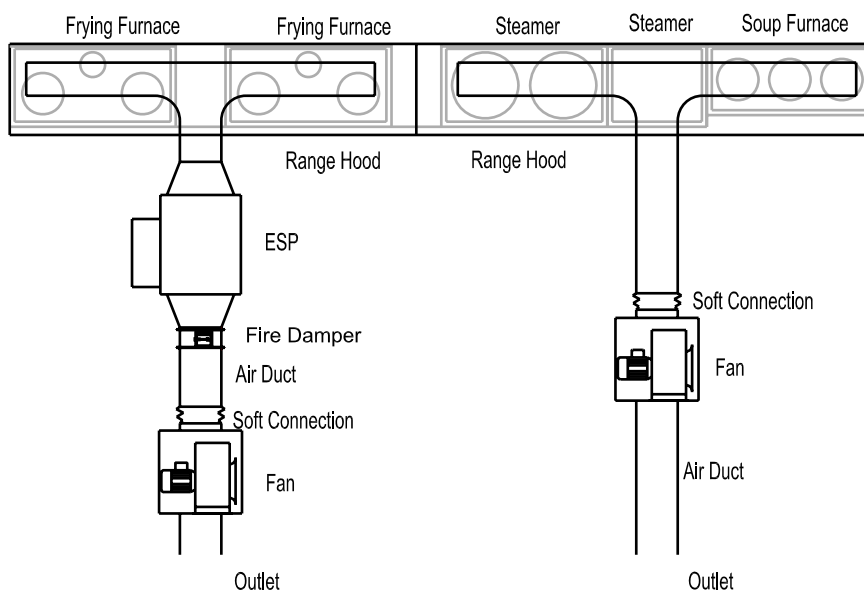


Figure 3-4



Requirements

- ✓ To assure the purification effect, please make sure that the joint of the air vent-pipe sealed firmly.
- ✓ In order to get the better purification effect, the flange duct connecting the inlet and outlet of ESP should be flat and suitable, and the length of the air duct after the flange duct should be 4 times or more than the diameter of it, and the duct should be straight.
- ✓ ESP can't work normally when it gets vibration from fan or other parts, so ESP and fan should be connected with soft duct.
- ✓ In common case, the design of the airflow should be bigger than actual airflow rate. For purification effect, ESP should work under the fixed airflow rate. User can use the transducer or install the valve for airflow adjusts on the outlet to achieve.
- ✓ The outlet of the fan should be equipped with a 1-2 meters straight pipe, which can reduce the additive resistance of the fan.
- ✓ In order to assure the purification effect, this equipment must work in a negative atmospheric pressure, and it should not be at the back of the air exhaust.
- ✓ When several ESPs work in parallel connection and all of them share the same fan, please make sure that the entire airflow rate distributing to each ESP is near the fixed airflow rate.
- ✓ Please install the awning for rain and sun-shine to assure the normal working of the ESP and reduce the unnecessary maintenance cost.

3.3 ESP Mainframe Installation

- ※ Put the equipment where as indicated above;
- ※ The equipment must be installed horizontally;
- ※ In order to reduce the weight of the equipment when installing, you can remove the electric fields, and fix them back after you have fixed the main body.

3.4 Water-heating Auto-clean Kit Installation

- ※ To install the water-heating cleaning tank on the bracket, see appendix 1;
- ※ Connection pipe between the ESP and the tank should be qualified hot water pipe;
- ※ The auto-clean tank should be installed beside the ESP, and the less elbows on the connection pipe, the higher water pressure, thus better cleaning effect.
- ※ To connect the auto-clean kit with the ESP, see appendix 2.



Requirements

- ✓ Put spare parts away to avoid possible damage caused by trampling or collision.
- ✓ Do not pile up other substance at the heat ventilation outlet of the ESP
- ✓ Connection of the hot water pipe should be secure, to avoid leaking or splashing.
- ✓ Thermal insulation measures should be taken on the water tank and the water pump when the temperature is below 0°C

3.5. Connecting Air Duct

- ※ To connect ESP, air duct, fire damper, soft connection & fan, see figures 3-1 and 3-2
- ※ On the flange, the heat-resistant seal ring should be added;
- ※ To avoid the distortion of the outline border of the fire damper, the screw holes should be matching between the flanges when installing fire damper, or the damper can't act normally;
- ※ Install the soft connection, please make sure the length should not less than 50MM;
- ※ Please make the air duct should have a certain pitch so that there will be less grease cumulated;
- ※ To install the oscillating damper on the feet of the fan;
- ※ No any combustible article is allowed to be put around the outlet of the fan. When the outlet is in 5 meters around the ESP, the height of the outlet should be 1.5 meter higher than the ESP.



Requirements

- ✓ The height of the drainage pipeline must lower than the height of the water-vent, and the drainage pipeline should be straight to assure smooth discharge.
- ✓ To assure the security of the ESP, the fire damper should be installed after the outlet of the ESP, each part of the air ducts should have a door for cleaning.
- ✓ Air flow divider should be put before the inlet of the ESP.
- ✓ The sewage from the ESP should be discharged according to the local environment regulations.

3.6 Notes



Requirements

- ✓ The ESP should be installed by the qualified personnel.
- ✓ When the ESP is working with high voltage, do not turn on the ESP before the installation is finished.
- ✓ It is forbidden to install the ESP around the explosive and combustible establishment.
- ✓ In order to avoid the leakage risk, user should install leakage protection device between the master power wire and supply power wire.
- ✓ The ground lead should be reliable and the resistance should be less than 2Ω.
- ✓ The installation of the ESP should be kept level and stable.
- ✓ For the security of the maintainer, the guard rail and maintenance platform should be built in a appropriate height.
- ✓ For the area with cold climate, the heat preservation should be done for the sewage pipe and the ducts explosive outside.

4 Equipment Debugging

4.1 Inspection before Installation

Check each item as indicated above and check if there is any improvement can be done and make sure each part has been installed correctly and firmly before the application.

4.2 Power Inspection

Before power on, please use the volt meter to check if the power of ESP and the fan match those indicated on the nameplate, and make sure that the earth resistance of the ground connection line is less than 2Ω . Of all the lines coming in and out of the central control box, there is an incoming power line connected to a 3-wire single-phase 230V/50HZ power supply, two outgoing lines connected respectively to the ESP and the water-heating auto-clean kit, and three control lines, one for the water-heating auto-clean kit, the other two for the ESP.

4.3 Adjust Airflow

First switch on the fan and make it work in a correct direction, and then adjust the airflow device with the help of airflow tester to assure the airflow of each ESP equal to or less than the fixed airflow. At the same time, check if there is any leakage of the air duct.

4.4 Commissioning

Please refer to the Article 5 Equipment Operation to check the function of cooking fume purification. You can see the matching indicators will light up if each item can work normally. If there is any confusion, please refer to the Article 7 of trouble shooting to get more information.



Remind

✓ When the operation fails, please refer to Article 7 for more information.

5 Equipment Operation

5.1 Panel Introduction

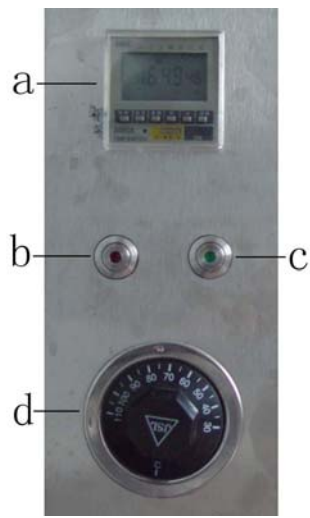
A. Panel of the Central Control Box

	① Power status (yellow indicator): indicates whether the power is on or off
	② ESP working status (green indicator): indicates whether the ESP is working or not.
	③ Auto-clean kit working status (green indicator): indicates whether the Auto-clean kit is working or not
	④ Start ESP (green button): Press to start ESP (fume purification function)
	⑤ Stop ESP (Red Button): press to stop the ESP (fume purification function)
	⑥ Start auto-clean (Green Button): press to start the auto-cleaning process
	⑦ Stop auto-clean (Red button): press to stop the auto-cleaning process.

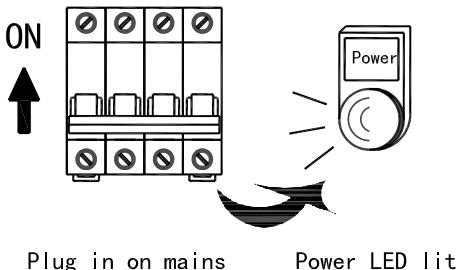
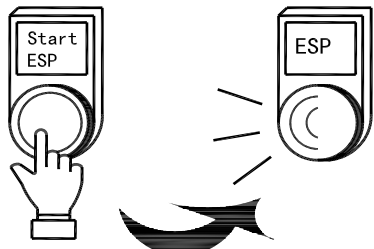
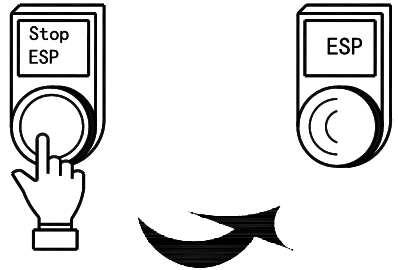
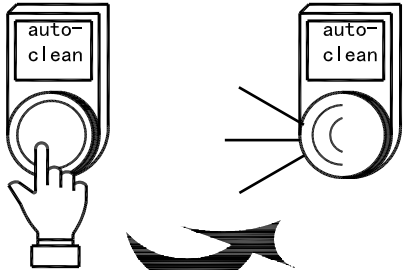
B. LED Panel of electric Box

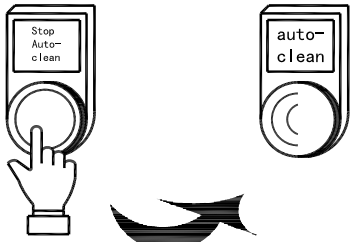
	① Green indicator: lights up when the power supply is normal.
	② Red indicator: lights up when the electric fields are working
	③ Yellow indicator: lights up when malfunction happens

C. Control panel of the auto-clean kit

	a: Multifunction Digital Timer: to program the auto-clean timing.	
	b:	Button: press to stop auto-clean
		Indicator: lights up when auto-cleaning is underway
	c:	button: press to start auto-clean
		indicator: lights up when the power supply is on
	d:	Adjustable temperature Controlling switch: to select temperature of the water to be heated up to (below 70°C in normal cases)

5.2 Operation guide

Plug in	 ON Plug in on mains Power LED lit	1. Plug the system onto the mains, Switch on the power switch to "ON" position 2. Power LED indicator on the central control box lit, green indicators on individual units of the electric power box lit.
Start ESP	 Press the start ESP button ESP LED lit	1. Press "Start ESP" button on the central control box 2. "ESP" LED indicator on the central control box lit
Normal operation status	※ "ESP" LED indicator on the central control box lit ※ Red indicators on individual units of the electric power box lit. ※ The electric fields make a continuous low-pitched buzzing or humming sound.	
Stop ESP	 Press "Stop ESP" while the system is working ESP LED out	1. Press "Stop ESP" button on the central control box while the system is working, to stop the fume purification function. 2. "ESP" LED indicator on the central control box out
Auto-clean	 Press "Auto-clean" button when the ESP stops "Auto-clean" LED lit	Press "Start Auto-clean" button on the central control box for 2 seconds, press green button on the cleaning tank for 2 seconds, or when the programmed timing comes, the system starts auto-clean function. Procedure: water feeding in (auto-clean LED flashes quickly) → water heated up to selected temperature (auto-clean LED flashes slowly) → auto-cleaning for electric field 1 starts (auto-clean LED lit for 45s) → water feeding in again

		(auto-clean LED flashes quickly) → water heated up to selected temperature (auto-clean LED flashes slowly) → auto-cleaning for electric filed 2 starts (auto-clean LED lit for 45s) → auto-clean function completed, the system is in “forbidden” status. Note: If the tank is not full within 20 mins after the auto-clean function starts, or if the water temperature cannot be heated up to the programmed temperature within 70 mins, then the auto-clean function stops and will remain locked unless you press the “Stop Auto-clean” button.
Stop auto-clean	 Press the “Stop Auto-clean” button while the function is on “Auto-clean” LED out	1. Press “Stop auto-clean” button on the central control box (or press red button on the auto-clean tank) while the auto-cleaning function is underway, the auto-clean function stops 2. “Auto-clean” LED indicator on the central control box out 3. The ESP system remains in forbidden status for 15 mins after the auto-clean function stops
Malfunction status	※ Press “Start ESP” button, the electric fields do not work ※ Press “Start Auto-clean” button, the water-heating auto-clean kit does not work ※ Please refer to the trouble-shooting section for solutions to the above-mentioned problems	

5.3 Caution



✓ There is high voltage inside the electric filed when the equipment is working, and it is forbidden to knock down the overhaul door and other parts before switching off the main power.

✓

6 Maintenance

User should make the effective maintenance on the equipment which can assure the long-term stable working condition and high purification effect.

6.1 Schedule for Maintenance

Time	Items for Maintenance
Daily	1. Keep the ESP surface clean 2. Check the outlet can work normally. 3. Check if there is any leakage on the hose and air-vent.
Monthly	1. Clean air flow divider 2. Clean the insulator 3. Clean the grease in the equipment 4. Wash electric field
Every other month	Check if the fireproofing valve can work normally or not.

6.2 Maintenance Guide



Requirement

- ✓ In order to protect the skin against the harm of alkalinity detergent, please wear goggles, gloves, helmet and protective cloth.

6.2.1 Clean air flow divider and Electric Field (EF)

Draw out air flow divider and electric field, shown in figure 6-1, use high pressure water spraying gun with home detergents to spray and clean it, shown in figure 6-2, if they are not very dirty. Or dip the air flow divider and electric field in a water tank filled with hot water with home detergent shown as figure 6-3. If it is very dirty, dip the air flow divider and electric field in a NAOH and hot water (1:25 in weight) solution.



Figure 6-1 take out the EF and air flow divider



Figure 6-2 spray washing of electric field



Figure 6-3 dip bathing of air flow divider



Figure 6-4 dip bathing of electric field with NaOH

6.2.2 Clean Insulator

Use detergents, or NaOH and hot water solution, to clean the 4 insulators supporting cathode frame, use clean water to rinse out residue and detergents on the surface of insulator, and then wipe it dry, shown as Figure 6-5.



Insulator supporting cathode frame



Bus with Insulator

6.2.3 Figure 6-5 Clean Insulator



Requirement

- ✓ Insulator must be washed by clean water and the detergent using for food, at last rub off the water on it, because the alkali electrolyte would cause the surface of the insulator to discharge and so the equipment would worked out of order.
- ✓ Insulators with crazings should be replaced.

6.2.4 Inspect and test electric fields

① Inspect methods: check anode cylinder whether it had been damaged and reformed or not ,shown as figure 6-6 ,if had ,please use circular wood stick to recover it shown as figure 6-7.

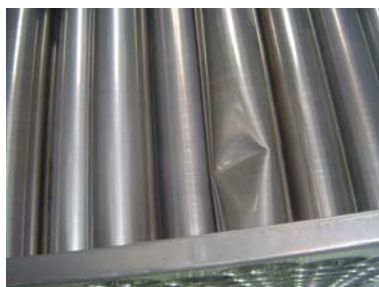


Figure 6-6



Figure 6-7

② Calibration steps: before install electric field back to ESP, please check the deviation of cathode and anode carefully and place electric field cells on the surface of somewhere flat, shown as Figure 6-8, and use deviation of cathode inspecting tools ,which offered by manufacturer, to inspect each cathode needle position shown as figure 6-9, it mean that the deviation of the cathode needle is within allowable ranges if can see some section of cathode needle in middle hole, otherwise, please revise cathode needle into allowable ranges with calibration pole shown as figure 6-10, and ensure that each cathode needle's position is at the right position before install electric field back to ESP.



Figure 6-8



Figure 6-9



Figure 6-10

③ Installation steps: There are 2 kinds of electric field, one is without thimble shown as figure 6-11, the other is having thimble shown as figure 6-12. To install them in order, please place and install the electric field without thimble into ESP first and then install the other one electric field with thimble into ESP.



Figure 6-11



Figure 6-12



Requirement

✓ The disassembled electric fields and other parts should be put away in a safe location to avoid damages caused by trampling and impact.

6.2.5 Clean Spraying Bar with Nozzles

Feed the spraying bar with water to see if there is blockage inside. If there is, tear down the individual nozzles for thorough cleaning (figure 6-13)



图 6-13

Re-install the spraying bar first after the electric fields (EF), insulators and nozzles are cleaned thoroughly, then the EF.

6.2.6 Usage of Cleaning Device

If there is much mist or grease inside some of the cylinders, users can clean the grease with the cleaning device to avoid possible distortion/ damages on the cathode needles caused by other cleaning devices. First, users can put the spring cleaning device into the cylinder to scratch the grease (figure 6-13), then use the silica gel device to move off the grease (figure 6-14).



Figure 6-13

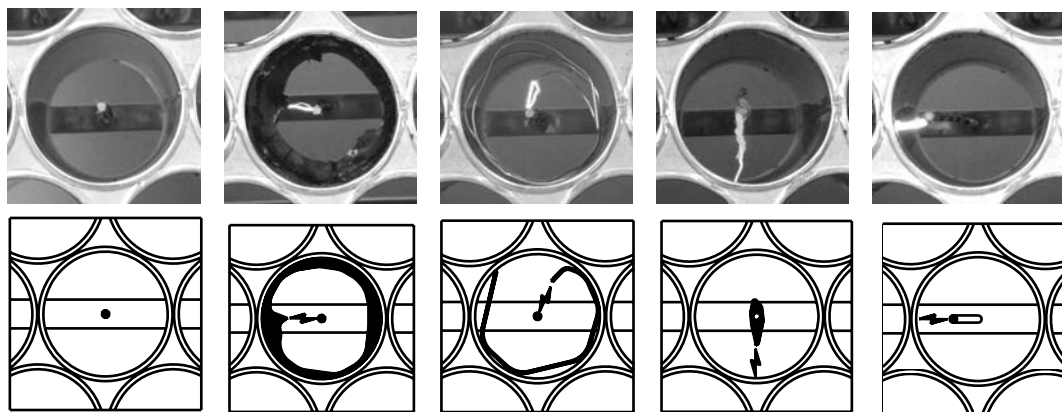


Figure 6-14

7 Trouble Shooting

7.1 Malfunction and Management Method

Malfunction	Possible Reasons	Method
The power is supplied normally but the electric field doesn't work	The fuse is burned in the power box.	Check the reason and replace the same fuse.
Yellow indicator flashing on the power box	The change of the density of the smoke causes the EF stop to work.	Press the button of "start up" again
	Please refer to the following situations if pressing the button of "start up", the EP works for several minutes, the indicator twinkles, at last the EPs stop to work.	
	There is drops after cleaning	Have the fan work for a short time and press the start up button
	Thick grease or other things in the electric fields (Figure 7-1~3)	Refer to the article 6 to handle.
	There is still lye or neutral detergent remaining on the surface of the insulator.	To clean each insulator with clean water and dry them
	In the electric field, the cathode is deviated from the anode. (Figure 7-4)	Refer to the article 6 to handle.
	The insulator is chapped.	Replace the insulator
	the temperature of the cooking fume is too high	To cool the cooking fume
Can't discharge air or not smoothly	The air flow divider is too dirty and draught can't go smoothly.	Refer to the article 6 to clean the air flow divider.



Clean, workable EF

Figure7-1

Figure 7-2

Figure 7-3

Figure 7-4

7.2 Caution

Caution

- ✓ Before maintaining the equipment, you must shut off the master power.
- ✓ After opening the overhaul door, user should use the screwdriver to release the remaining electrons of the electric field (referring to right picture). That is to have a short touch on the cathode and anode of one cylinder with the metal part of the screwdriver.



Remind

- ✓ User should keep the record of maintenance.

8. Others

8.1 Unpacking

The unpacking of equipment should be careful, and check if the accessories are complete according to the packing list.

8.2 Transportation and Storage

Please refer to relevant international rules on packing, delivery, storage. The equipment should be handled with care, and avoid the collision and damage on the surface. The equipment should be stored in dry and ventilative environment, and kept away from high temperature, dampness and caustic fume.