



INSTRUCTION MANUAL

Electrostatic Food Spray Unit Model SAS Cone Mk.III

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Dear Customer,

Thank you for buying a new ELECTROSTATIC FOOD SPRAY UNIT model SAS CONE Mk. III. Every care has been taken, from design to manufacture, to ensure that this product gives you complete satisfaction.

Electrostatics is an environmentally responsible way to atomize powder/oil, because it significantly increases quality and production, equally decreases powder/oil costs.

How does it work?

The aim is to eliminate wasteful over spray and put as much coating material on the target as possible. This is achieved by negatively charging atomized powder/oil particles so that they are attracted to the grounded work piece, opposites attract.

A charging electrode is located at the tip of the electrostatic spray head or atomizer. The powder/oil is atomized as it moves past the electrode, its particles become ionized - negatively charged. An electrostatic field is created between the charging electrode and the grounded work piece, the spray is concentrated within it.

Further atomization is achieved as charged particles form a fine cloud. Due to the electrostatic attraction, spray that would normally be lost, ends up on the back and sides of the work piece to produce a "wrap-around" effect.

When to use electrostatics!

When you want to achieve maximum transfer efficiency and minimize coating waste and dusting/misting emissions, while achieving maximum application wrap around effect, high production and high flow rates.

The advantages!

Increased transfer efficiency and reduced over spray, which results in significant cost savings and reduced dusting/misting emissions. We build our system with safety in mind, with flexible, lightweight low voltage cable going to the generating spray head.

State-of-the-art technology!

With our new modular design, Spice Application Systems has been the leader in the electrostatics food industry for many years. With proven components and circuitry built to IP 65, it is a combination that will be hard to beat.

The new Control Unit has the added benefit of putting total control at your fingertips. With its unique design, it provides the ability to monitor current flow and control the pneumatics, in addition to providing the controls to operate your electrostatic spray heads.

To obtain the best performance and reliability from this equipment it is strongly recommended to read the instruction manual thoroughly before attempting to use the equipment.

WARRANTY

Spice Application Systems Ltd guarantees that all equipment manufactured by them will be free from defective workmanship or materials for a period of 12 months or 3000 working hours, from the date of delivery of the equipment, whichever comes first.

We will rectify any manufacturing or material defects by means of suitable repair or supplying a replacement part.

Always providing that:

- ➔ Any such defect(s) is reported in writing, within the 12-month period.
- ➔ All equipment is installed, operated and maintained in accordance with specific recommendations of Spice Application Systems Ltd and good industry practice.
- ➔ Spice Application Systems Ltd supplies all spare parts and consumable items.
- ➔ Consumable spares are inspected frequently and replaced as necessary. The life of these varies with the application and they are not guaranteed for any specific period.
- ➔ Maintenance spares are inspected and replaced if necessary every 12 months or 3000 operated hours, whichever is sooner.
- ➔ Any consequential loss, however caused is expressly excluded from this guarantee

Spice Application Systems Ltd will not be liable for any repairs or replacements (including labour costs) without our written approval.

Spice Application Systems Ltd gives no performance guarantees, unless specifically indicated in our proposal. The effects erosion, corrosion and general wear and tear are specifically excluded.

Spice Application Systems Ltd reserves the right to amend or change specifications, as part of their continuous development policy.

We make no other guarantee or representation whatsoever, expressed or implied.

EC DECLARATION OF CONFORMITY FOR MACHINERY



The manufacturer: Spice Application Systems Ltd
PO Box 1190, Oxford
OX4 4GH, England, UK
Tel: 00 44 1865 747 634
Fax: 00 44 1235 818 443

Herewith declares that "the Electrostatic Food Spray Unit" is in conformity with the provisions of:

- EU Directive 2014/34/EU – certified as Category 3D 40°C and manufactured in line with Internal Control of Production as outlined in the Directive
- BS EN ISO 12100:1 – Safety of Machinery
- BS EN ISO 12100:2 – Safety of Machinery
- BS EN 60079:0 and BS EN 60079:11 – Equipment for Use in Potentially Explosive Atmospheres
- EN 50177 – Stationary electrostatic spraying equipment for flammable coating powder
- EN 60204 IP – Type protection: contact, foreign bodies and water protection for electrical equipment
- EC Machinery Directive 2006/42/EC
- EC Low Voltage Directive 2006/95/EC
- EC Directive of Electromagnetic Compatibility 2014/30/EU
- BS EN 61000-6-3:2001 – Electromagnetic Compatibility
- BS EN 61000-6-1:2001 – Electromagnetic Compatibility
- BS EN 50050-2:2013 – Electrostatic hand-held spraying equipment. Safety requirements. Hand-held spraying equipment for ignitable coating powder

All as amended, and with national implementing legislation.
Established in Oxford on 1st October 1999.

Spice Application Systems Ltd
P.O. Box 1190
Oxford OX4 4GH
England, UK.

Peter King
Managing Director

WARNING

All controls within the Control Box have been adjusted for optimum performance and safety during manufacturing.

The Electrostatic Generating heads and control box is sealed for IP 65.

Re-adjustments, alterations or substitutions of any component may result in a hazardous operating condition a failure and possible damage to the equipment as well as overriding the built-in safety features.

Any unauthorised modification will invalidate the warranty and could endanger the work force.

Under no circumstances are any alterations allowed to the electrostatic equipment without specific written instructions and consent from Spice Application Systems Ltd.

SAFETY GUIDELINES

- ➡ The person in charge of the manufacturing work area should ensure that personnel are properly trained in the use of this equipment. The safety rules which follow should be fully understood and applied at all times.
- ➡ Never point the spray unit at any person or animal.
- ➡ Spraying certain products can be dangerous, depending on what is being sprayed so full protection for operators in the form of instructions supplied with that product must be adhered to at all times.
- ➡ The normal safety rules and precautions for powder atomisation must be observed.
- ➡ For more information, consult the local safety rules. In addition, the following precautions must be observed.
- ➡ **WARNING!** Failure to observe one of the following rules may affect the operation of the equipment and create unsafe conditions.

ALL personnel who are associated with the coating operation should read and fully understand this manual. It is especially important that the operators of the electrostatic equipment and their supervisory personnel understand the requirements for safe and proper usage of the electrostatic process.

TECHNICAL FEATURES

The ELECTROSTATIC FOOD SPRAY UNIT model SAS CONE Mk III spray unit uses the principal of atomising the spice as it is pumped from the cone. The powder becomes atomised and passes through an electrostatic field, it is then able to obtain the ultimate wrap-around effect, onto a grounded product.

An electronic safety device, incorporated into the SAS power supply unit, automatically detects the presence of a grounded object in the vicinity of the spray head. Once this ground approaches within 10 cm / 4" this device reduces the voltage.

Pressure/Connections:

Control air out	polyamide hose Ø 6 x 8mm
Control air in	polyamide hose Ø 8 x 10mm

Electrical features:

Ionization	Negative charge on the electrode
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Weight:	Total weight of electrostatic generating head: 0.9kg/ 1.98lb
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Stainless Steel Control Box: Food Quality 316/304; Total weight: 6.8kg / 14.96lb

Plastics:	Polypropylene Co Polymer-Blue Acetal Co Polymer-Blue
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Cable:	Polyurethane	Black	110/240v
	Polyurethane	Blue	3-13.5v

ELECTRICAL CONTROL UNIT

Mains Electrical Supply	- Single Phase 3 Wire (Live-Neutral-Earth)
Supply Voltage	- 90 – 264V a.c.
Supply Frequency	- 47 – 64 Hz
Connected Load	- 40 VA
Circuit Protection	- 0.6 A SP Miniature Circuit Breakers – Live
No. of Outputs to Applicators	- 1 or 2 Applicators
Output Voltage to Applicators	- 3.5 – 13V d.c.
Output Current to Applicators	- 400mA Max
Protection Category	- IP 65
Operating Temperature	- -10°C/+60°C
Total Weight	- 6.80kg

ELECTROSTATIC GENERATING HEAD

Supply Voltage	- 3.5 – 13V dc
Supply Current	- 400mA Max
Output Voltage	- 20-85Kv
Output Current	- 50uA Max
Protection Category	- 1P 65
Operating Temperatures	- -10°C/+80°C
Total Weight	- 0.90kg

PNEUMATIC – CONTROL UNIT

Compressed Air Supply	- Twin system:- 8 Bar (114psi) Max / 5 Bar (75 psi) Min - Single system:- 5 Bar (75 psi) Max / 3 Bar (43.5 psi) Min - Air to be clean, dry, oil free, food quality
Compressed Air Consumption	- 10m ³ /hr (6 c.f.m) per twin applicator
Air Out	- Maximum pressure 2 bar / 29psi per system
Max Water Vapour Content	- 1.3g/m ³
Max Oil Vapour Content	- 0.1 p.p.m.
Regulated Air Output	- 0-4 Bar

CABLE COLOUR CODING FOR CONTROL UNIT

The cable colour coding used for the Control Unit and its supplied mains cable is as follows:-

<u>Pole</u>		<u>PIN No</u>	<u>US/JAPAN</u>	<u>U.K.</u>
Live	<i>L</i>	Pin 1	Black	Brown
Neutral	<i>N</i>	Pin 3	White	Blue
Earth / Ground	<i>E</i>	Pin E	Green	Green/Yellow

For U.K. Equipment

The wire which is coloured **GREEN** and **YELLOW** must be connected to the terminal in the plug which is marked with the letter *E* or by the earth symbol, or coloured green or green and yellow.

The wire which is coloured **BLUE** must be connected to the terminal which is marked with the letter *N* or coloured black.

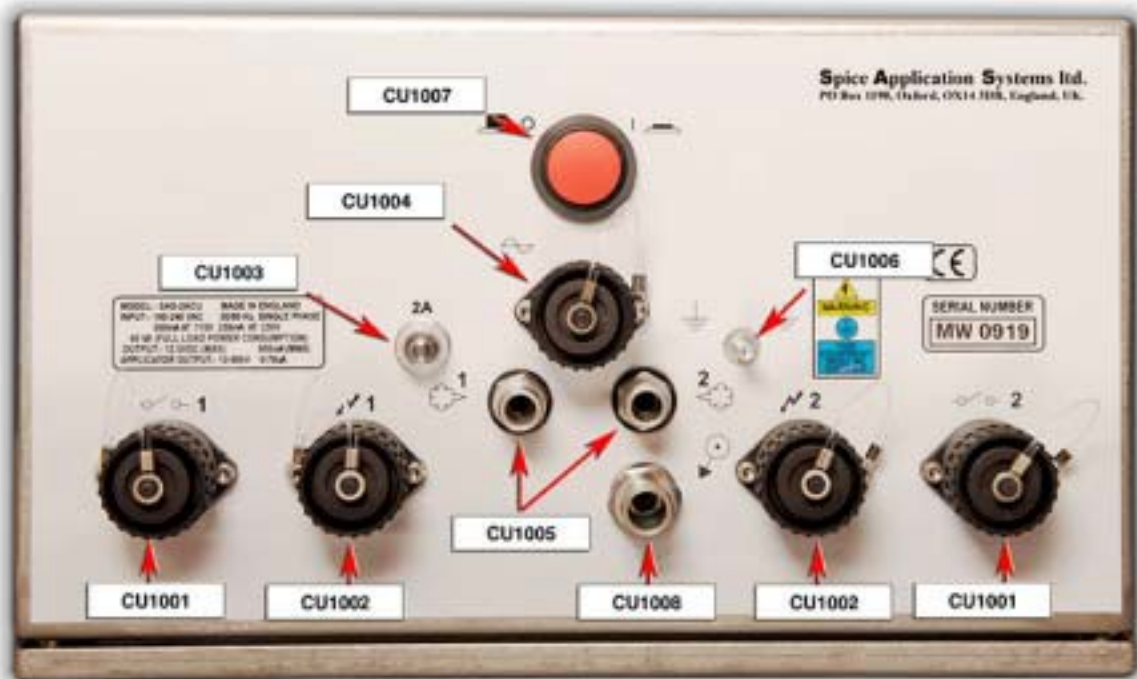
The wire which is coloured **BROWN** must be connected to the terminal which is marked with the letter *L* or coloured red.

The method of disconnection from the mains electrical supply is by removal of the mains lead plug from its respective supply socket.

IMPORTANT

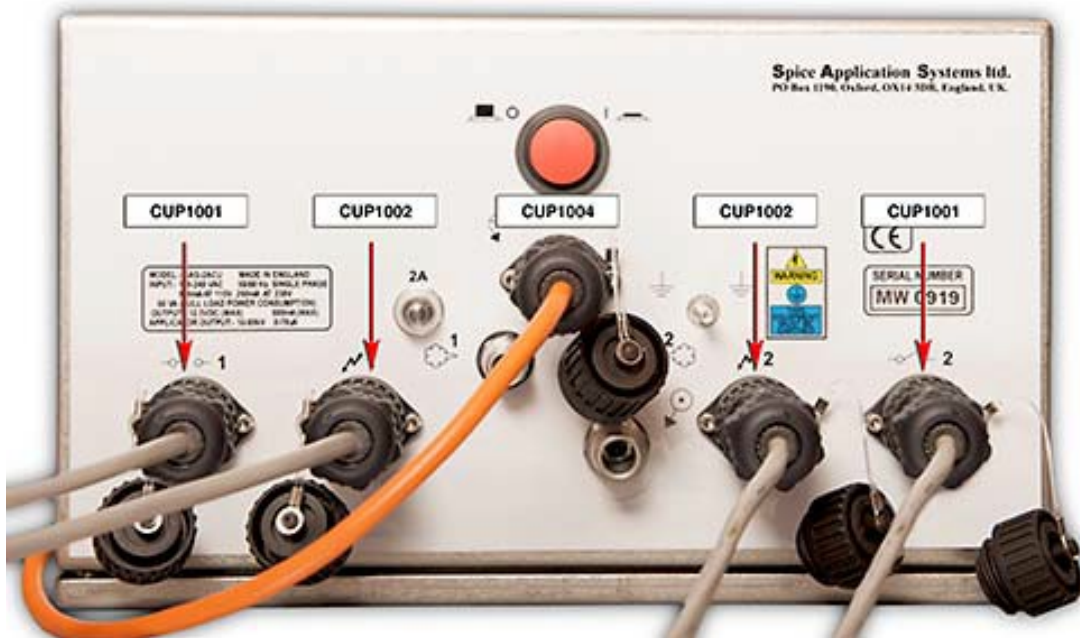
When fitting a plug to the mains lead it is essential that it contains an earthing/grounding contact and that this is connected. Under no circumstances should this equipment be connected to a mains supply which does not include an earthing/grounding wire and contacts. For example, wire extension leads, as used for some domestic equipment, **MUST NOT BE USED.**

CONTROL UNIT FITTINGS



- CU1001: Remote trigger cabinet plug 6 pin Female (IP65)
- CU1002: Electrostatic generating head cabinet plug 4 pin Female (IP65)
- CU1003: Circuit Breaker (IP65)
- CU1004: Mains electric input cabinet plug 4 pin Male (IP65)
- CU1005: Pneumatic Air output quick release 8mm (IP65)
- CU1006: Terminal, Earth Post (IP65)
- CU1007: Mains electric master on/off switch (IP65)
- CU1008: Pneumatic Air input quick release 10mm (IP65)

CONTROL UNIT PLUG IN FITTINGS



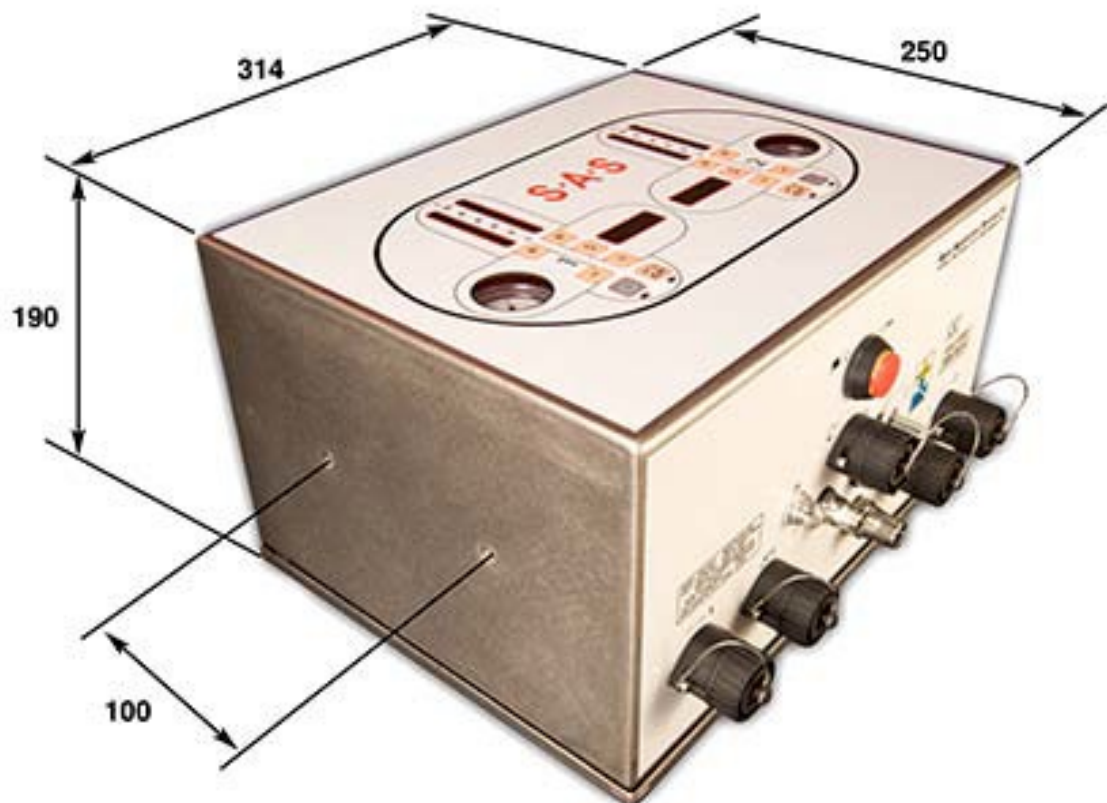
- CUP1001 Remote Trigger plug 6 pin Male (IP65)
- CUP1002 Electrostatic generating head plug 4 pin Male (IP65)
- CUP1004 Mains electric input plug 4 pin Female (IP65)

CONTROL UNIT FRONT PANEL

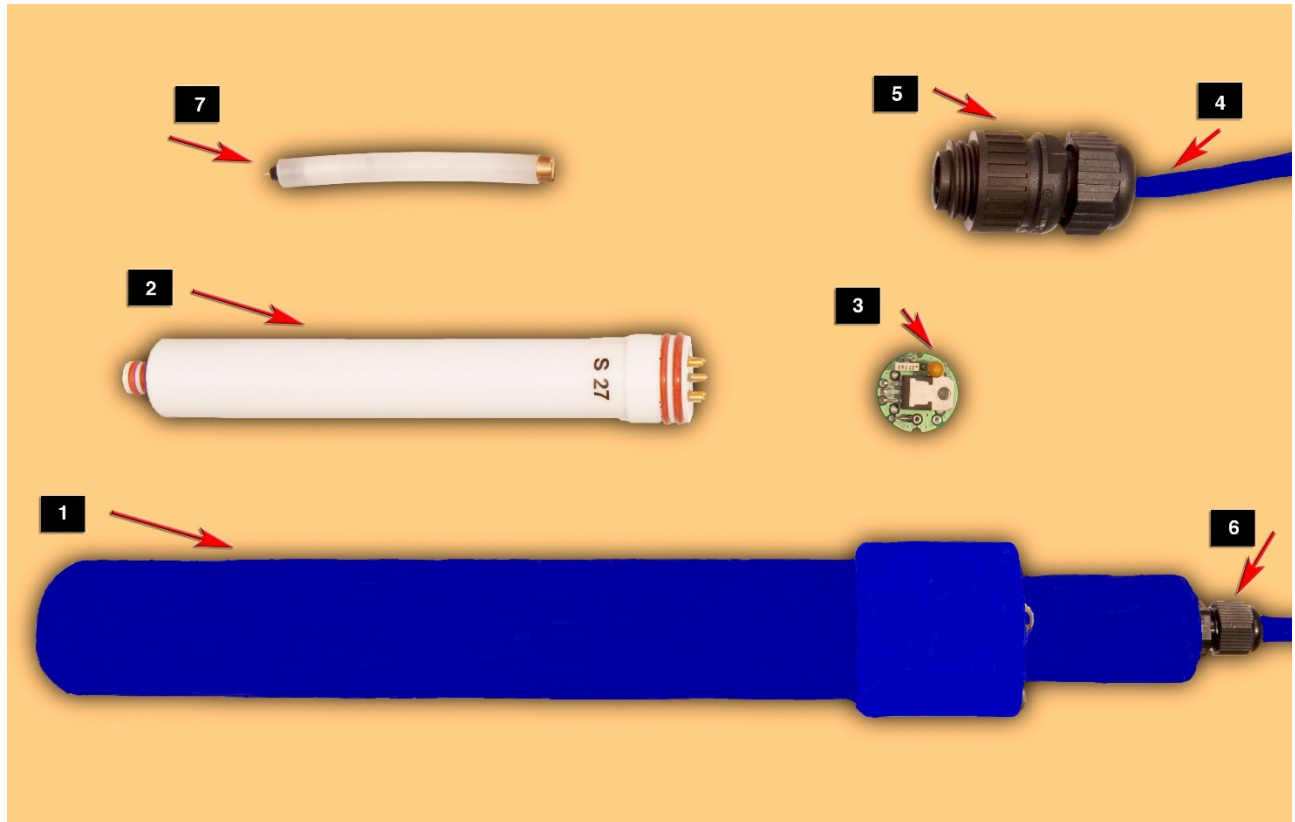


- 1 0-2bar Pressure gauge
- 2 Pressure regulator adjustment + (rise in air pressure)
- 3 Pressure regulator adjustment - (fall in air pressure)
- 4 Pre Selection program numbers up +
- S Lock selection button
- 5 Pre Selection program numbers -
- 6 Local on/off switch
- 7 Remote trigger on/off switch
- 8 Program information numbers
- 9 Ampage dial (orange)
- 10 Voltage dial (green)

CABINET FIXING SIZES



ELECTROSTATIC GENERATING HEAD



- | | |
|------------|--|
| 1. GH3001 | Generating head MK3 complete |
| 2. GH3002 | Cascade MK3 |
| 3. GH3003 | Oscillator board MK3 |
| 4. GH3004 | Cable MK3 |
| 5. CUP1002 | Electrostatic generating head plug 4 pin Male (IP65) |
| 6. GH3006 | Cable Gland |
| 7. GH3007 | Electrode |

CONE AIR PRESSURE CONTROL

The unit can hold in memory 100 different air pressure settings, this is so you can easily change the pressure for different powders.

The air pressure needs to be stored in the memory by a competent person who will be working with the unit.

The operator will only need to press one button when changing to another type of powder.

Automatic Changing of Air Pressure

- ➡ Turn on unit using local on/off switch button 6
- ➡ Adjust air pressure press button 2 to give more air & button 3 for less air
- ➡ To set the required pressure press button S once
- ➡ Choose the program number button 4 to go up & button 5 to come down
- ➡ To set the program press button S
- ➡ To now use the programmed system use buttons 4 & 5 to go up and down the scale

OPERATING PRINCIPLE

The SAS control power supply transforms the 110/220 Vac into an adjustable voltage which can be set from 3.5 to 13 Vdc.

The generator at the spray head converts the 3.5 to 13 Vdc into 85 kV negative charge, the material being applied is drawn to the positively grounded product.

INSTALLATION

1. The vibratory powder transfer unit needs to be positioned just below the screw feeder and the spray head needs to be positioned inside the drum facing the tumbling product at a 45° angle.
2. The vibratory system is delivered with a support bar and fixings to allow adjustment for the correct positioning of the vibratory tray.
3. The electrode needle on the electrostatic generating head must always be pointing away from the vibratory tray.
4. The vibrator control needs to be fitted close to the vibrator to allow operators to adjust the vibration speed. If the vibrator control has to be moved to a fixing further away than the standard distance of 1.5mtrs (6') a junction box has to be fitted to a rating of IP 65. Contact Spice Application Systems for this fitting.
5. The electrostatic generating head is delivered with the support bars.
6. The product to be coated must be able to fully tumble and roll in front of the spray pattern. If it does not do so the electrostatic effect will not activate properly and will give a poor quality finish to the product.
7. The appropriate distance between the spray head air knife and the product to be coated is to be of about 20 - 45 cm / 8" - 18" (minimum distance is 15 cm / 6").
8. The control unit must be located outside the flavouring drum.
9. **All metal parts, pumps, containers, conveyors (feeding in and out of the drum) and any other conductive article within 2mtrs/ 6ft - must be grounded.**
10. **Keep the spraying area clean. Remove all unnecessary metal components.**
11. After fixing the electrostatic generating head place inside the drum. Fix the cable (CUP1002) with plug attached to the back of the control attachment, to electrical plug marked "1" and lock into place. (Locking mechanism already attached to control). If using a twin head system attach both cables, first to "1" and the second to "2". (see page 9)

12. After fixing the electrostatic generating head place inside the drum. Fix the 8mm airline to the bottom air fittings on the back of the control to fitting "1" Push in firmly. If using a twin head system attach both 8mm air lines, first to bottom air fitting "1" and the second to bottom air fitting "2" (see page 8). The other end of the air lines attached to the air fittings on the air knife under the vibratory tray.
13. Plug into rear of control (CU1008) a 10mm airline from the main air supply. (The air always have to be clean and dry. Fit a filter if necessary.)
14. Plug mains electric supply into back of control (CU1004) and lock into position.
When wiring up the mains supply the earth must be wired to the factory mains earthing system.
15. Item CU1001 is for a remote trigger to facilitate the unit to switch on and off with an existing production line. If not using, make sure the dust cap is fitted and locked into place.
16. Wire the earthing cables from the drum to the earthing point at the rear of the control. (CU1006).
17. **The drum must be earthed in 2 places with the earthing contacts rubbing against the wall of the drum. The outgoing and incoming vibratory conveyors to and from the drum must always be earthed and all metal within 2mtrs of the drum.**

ATOMIZATION

1. The part to be coated must be connected to the ground continuously.
2. Do not use the equipment if there is an air leak in the hoses.
3. Be sure that the product does not come closer than 15 cm / 6" and no further than 45cm/18" from the spray head.

POWDER FLOW SYSTEM

- 1 Position the cone under the screw feeder (using an adaptor if required), it must be aligned correctly to allow the powder to fall into the cone **NOT IN THE CENTRE BUT TO ONE SIDE** so the powder **rolls** into the injector. If the powder is dropped in the centre it will **block up** the injector inlets.
- 2 Screw the injector into the bottom of the cone **(Make sure the injector is screwed together tightly and is fully closed to the end of the thread).**
- 3 Attach the powder feed hose into the spray nozzle (page 13). **(Make sure the hose is pressed fully home in the nozzle and the locking ring is pulled firmly into place).**
- 4 Position the spray head at about a 45 angle to the product.
- 5 The electrostatic generating head need not be moved for cleaning. The system is IP65 6 - The system must be set-up to freely transport the powder at the maximum line rate, i.e. set the air pressure at the spray nozzle as if the plant is at maximum production.

START UP

ELECTROSTATIC CIRCUIT

1. Connect the SAS control to its power source
2. Supply the SAS control with clean dry compressed air minimum 4 bar / 58 psi
- 3 Turn the power-supply ON/OFF switch to the ON position (CU1007)
3. The power supply emits a constant voltage at any given setting from 3,5 to 13 Vdc. This regulated voltage is transformed into high voltage within the generator barrel before being delivered to the spray head

QUALITY ADJUSTMENT

Adjust the spraying parameters ON THE FRONT OF THE CONTROL:

1. Material flow rate - adjust by pressing + for more air and - for less air. Press set to lock into memory
2. Electrostatic effect - high voltage is on green maximum, yellow light between 75-100%
3. Adjust the vibrator speed to when the powder is coating the bed of the vibratory tray. This will give an even curtain drop onto the air knife.
4. The air hoses and the generating head must remain dry.

CLEANING METHOD

- ➔ The ON/OFF switches on the power supply and to the spray head must be OFF before starting cleaning operation.
- ➔ Wait for 10 seconds before entering the spray area.
- ➔ All metallic parts located within and around the spray head must be correctly connected to the ground. The floor must be electrically conductive and grounded.
- ➔ Only apply a moderate amount of cleaning solution onto a clean soft cloth, or bristle brush, to clean the spray head and hoses.
- ➔ Synesthetic resins used in the fabrication of the electrostatic spray head can react with certain cleaning agents. Check with Spice Application Systems.
- ➔ **CAUTION:** avoid using the most toxic cleaning agents. Do not use chlorinates.
- ➔ Dry the spray head carefully and thoroughly with air.

CLEANING PROCEDURE

1. Turn the power supply ON/OFF switch to OFF position.
2. Hose down the complete vibratory system in place (CIP). There is no need to remove the system for cleaning
3. Wash thoroughly and dry completely with compressed air before commencing production. **THIS IS VERY IMPORTANT. IF THE UNIT IS NOT DRY IT CAN LEAD TO POWDER BUILD UP ON THE VIBRATORY TRAY.**

WARNING

Never switch ON the electric power supply unit during the washing and cleaning operation.

Before switching ON the electrostatic effect:

1. Install the air knife into the electrostatic generating head, making sure it is set in the horizontal position.
2. Connect the flexible air tube to the air knife.
3. Check that the air knife and vibrator are completely dry.

SERVICING

1. The electric power supply must be interrupted before any cleaning operation **(power supply unit switched off)**.
2. When shutting off the voltage, **wait for some 10 seconds** so that the electric charge has time to reach the ground.
3. Do not soak or immerse the spray unit or any plastic parts in a solvent. This could result in damage and impair the safety circuits. If necessary, clean the plastic parts with a soft brush soaked in a soapy water solution after hosing down and then dry immediately.
4. **Before disconnecting hoses, ensure that the circuit is no longer pressurized, the air is turned off and that the electric current is also switched off.**
5. After any repair, prior to turning on the power supply:
 - a. Ensure the air knife is correctly installed into the spray unit.
 - b. Reconnect the three-pin plug and cable assembly to the power source.
 - c. Reconnect the ground wire to an earth connection.
 - d. Reconnect low voltage cable between SAS control and electrostatic generator head.

EXTENDED SHUT DOWN PERIOD

1. Turn the on/off switch on the power supply to the OFF position
2. Carry out a complete flushing of the system. Carefully clean the spray head with a solution soaked rag or bristle brush.
3. Dry the clean parts with compressed air. Be sure the air spray nozzle is clean.

WARNING

- ➡ Never leave assemble and spray head immersed in cleaning solution.
- ➡ Always store in a dry place.
- ➡ Never use metal tools to clean the spray head.

DAILY CARE EXTENDED SHUT-DOWN PERIOD

1. Air knife and vibrator are kept clean.
2. All hoses are not worn or crimped, all air and coating material connections are tight.
3. All electrical cables are not broken, twisted or knotted.
4. All earthing wires on the in/out vibratory trays and the drum are connected correctly.

TROUBLESHOOTING

Unit will not operate

1. **Mains connector not fitted to control panel:**
Connect to rear of control panel (page 6, item 15)
2. **Not connected to a suitable mains electrical supply:**
Engineer to check supply.
3. **Not switched on:**
Turn the switch on at the front of the control panel (page 4, items 3 & 5)
4. **Circuit breakers tripped at the rear of the control panel:**
Press circuit breakers inwards. If they trip out again after turning on the unit call for an engineer.

Spitting Spray

1. **Insufficient air pressure:**
Turn up the air pressure
Check hoses for leaks and tighten fittings.
2. **Empty powder hopper in the screw feeder:**
Fill the hopper.

No power delivery

1. **Screw feeder blocked:**
Empty screw feeder, remove screws and clean thoroughly.
Reassemble and refill hopper.
2. **Insufficient air pressure to the air spray head:**
Increase air pressure at the control.
3. **Pinched or restricted airlines:**
Check and replace if necessary
4. **No powder in the screw feeder:**
Fill the screw feeder hopper
5. **Vibratory tray not working:**
Turn on vibrator at the vibrator control

Poor atomisation of powder

1. **Air nozzle obstructed or worn down:**
Clean nozzle or replace with new.
2. **Low air pressure:**
Increase air pressure.

Powder spraying, poor adhesion to product:

1. **Voltage output too low:**
Adjust the vibratory tray further away from the product.
2. **Earthing not correct:**
Reset the earth wiring and contacts
3. **Spice not suitable for electrostatic application:**
Contact spice supplier.

4. **Spice particles too large:**
Contact spice supplier.

Partial or missed coating of product:

1. **Vibratory tray incorrectly positioned in the drum:**
Set to correct position about 45° angle facing the tumbling product.
2. **Insufficient powder output:**
Increase screw feeder output.
Refill powder hopper.
3. **Flavouring drum speed/angle:**
Increase or decrease drum speed.
Raise or lower drum angle.

Dust in the air (dusting):

1. **Electrostatics are not turned on:**
Turn on at the control.
2. **The low voltage cable not connected or is damaged:**
Replace cable if needed. (This cable must be supplied by SAS).
3. **Earthing not correct:**
Reset the earth wiring and contacts.
4. **Powder very fine (under 60 microns)**
Powder supplier to reformulate the powder.
5. **Air pressure too high:**
Turn down the pressure at the control.

Operators are getting electric shocks:

1. **Earthing not connected:**
Reset the earth wiring and contacts.
2. **Operator not wearing conductive clothing:**
Purchase conductive foot gear, or conductive operator earthing straps.

Electric shocks from the intake and exit vibratory conveyors:

1. **No earthing on the vibratory trays:**
Fit earthing straps to both conveyors.

STATIC ELECTRICITY TESTER. (S.E.T.)



Instructions:

Always “self-test” the tester (S.E.T) before you start. Do this by touching both ends simultaneously. The red light should illuminate indicating that the S.E.T. is functioning correctly.

Electrostatic test.

1. Turn on the electrostatic generating head.
2. Hold the S.E.T. with the screwdriver tip between the fingers. With the handle end pointing towards the generating head, about 1mtr. Away, move towards the electrode at the end of the electrostatic generator and you should see a strong red light illuminate, being at it strongest when you are within 400-500mm from the electrode.
3. **Always make sure you are holding onto an earthing point when doing this test, or you are wearing conductive shoes.**
4. If no red light appears refer to the main manual under Fault Finding.

REMOTE OPERATION WIRING



SCHEMATIC DIAGRAM

Schematic Diagram

