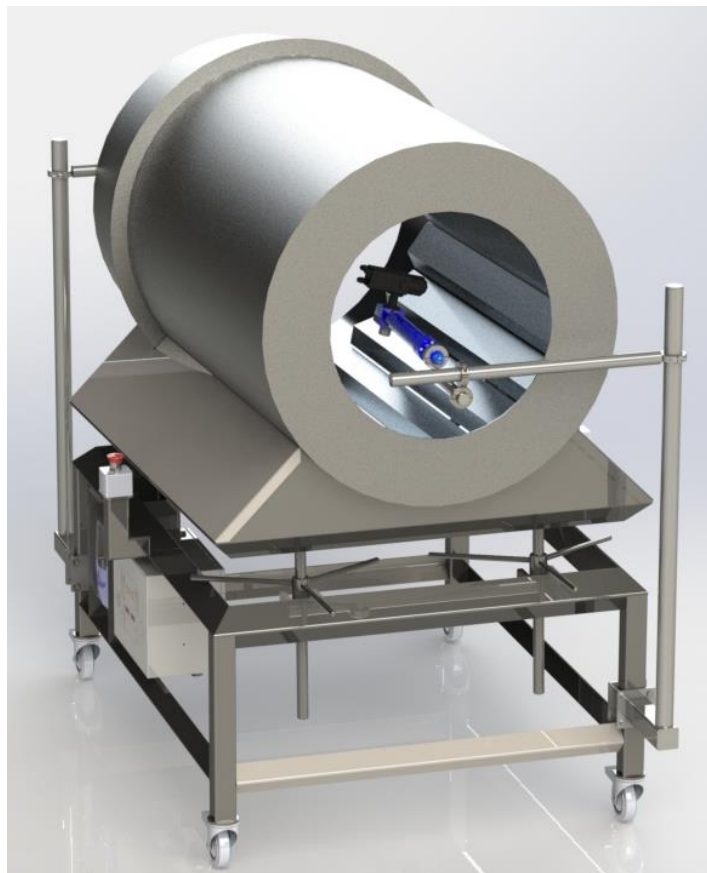




# **SAS 10/20 – Electrostatic Oil Applicator**

## **INSTRUCTION MANUAL**



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**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.**

## WARNINGS OVERVIEW

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 atomisation must be observed.
-  For more information, consult the local safety rules. In addition, the following precautions must be observed.

**WARNING!** Failure to observe the safety precautions contained within this manual could result in operational difficulties of the equipment and potential to 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 and maintenance team of the electrostatic equipment and their supervisory personnel understand the requirements for safe and proper usage of the electrostatic process.**

# EC DECLARATION OF CONFORMITY FOR MACHINERY



The manufacturer: Spice Application Systems Ltd  
Unit 3, Hawksworth  
Southmead Industrial Estate,  
Didcot  
Oxfordshire  
OX11 7HR, 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
- Plastic Blue Acetal Copolymer EU Directive 2002/72/EC/FDA Directive 21CFR
- EC No.1935/2004

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

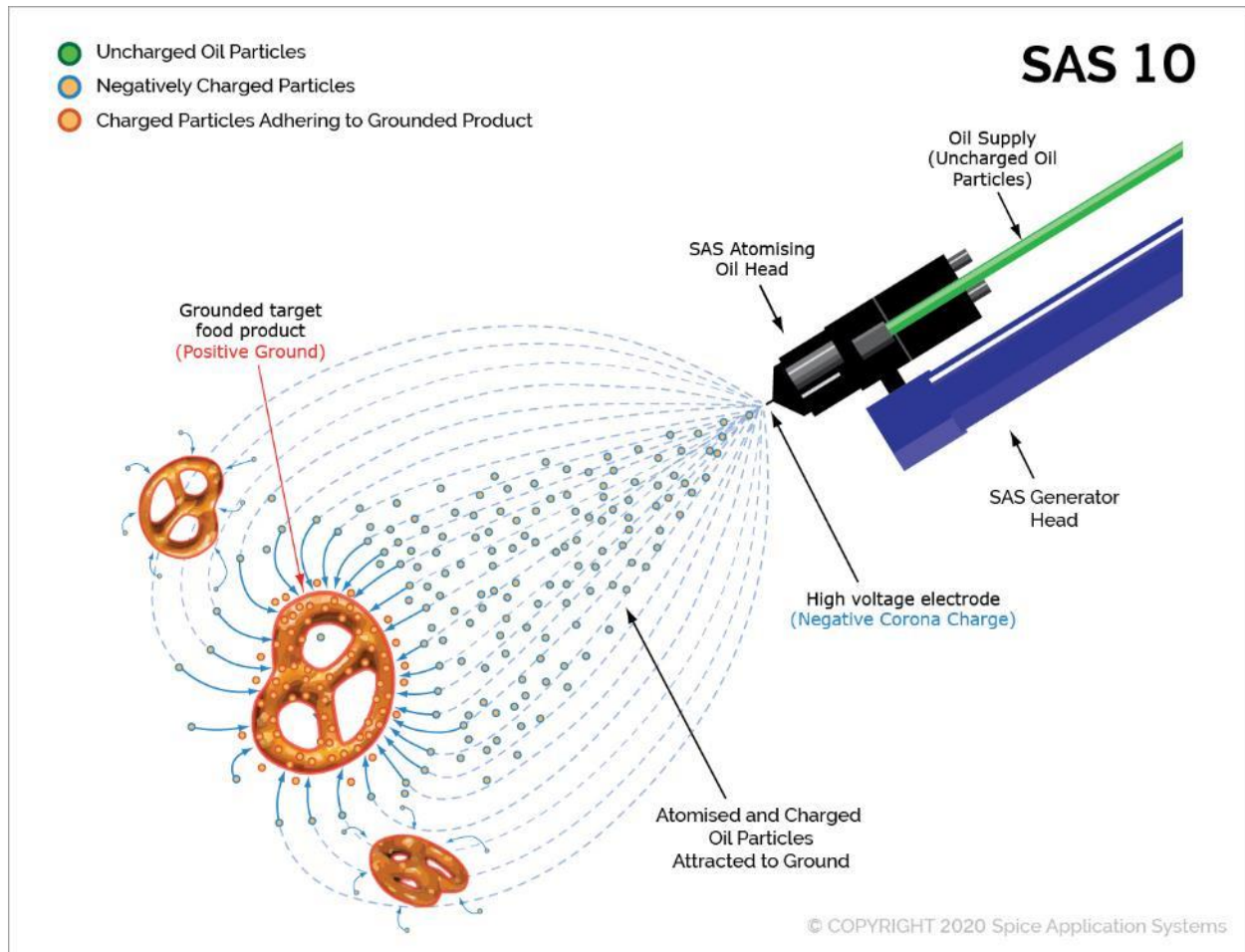
*Spice Application Systems  
Unit 3 Hawksworth  
Didcot, OX11 7HR  
England, UK*

Peter King  
Founder

# ELECTROSTATIC INTRODUCTION

## What is Electrostatics

Electrostatics is an environmentally responsible way to apply coating materials, significantly increasing the quality of the finished product, while substantially decreasing powder/oil costs through more effective use of materials.



## 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 generator 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.

The product to be coated (chips, tablets, etc.) is Grounded from contact within the rotating drum/wire bely flat chamber. When the coating material is released, it is attracted to the Grounded product. Due to the electrostatic attraction, coating material that would normally be lost ends up on the back and sides of the target product to produce a “wrap-around” effect.

# **ELECTROSTATIC INTRODUCTION**

## **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**

Up to 98% coating of all products, with greatly improved coating over traditional methods, less powder usage, cut down of dusting, cleaner working area and cleaner drum, all resulting in less line contamination.

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.

## **Typical Electrostatic Applications**

- Pharmaceuticals: coating tablets granule formation
- Horticulture: powder onto seeds
- Agriculture: powder/liquids on potato or cattle feed
- Meat: fresh poultry and processed meats-powder & liquid flavouring
- Fish: oils & powder
- Breakfast Cereals: vitamins & flavouring in powder/liquid form
- Snacks, crisps, nuts, extruded and pasta pellets: powder & liquid spices
- Confectionery: powder onto mints, chewing gum, etc.
- Pet food: powder & liquid enhancers onto kibbles, biscuits & chew bars
- Dairy: starch onto cheese
- Bakery: oil & powder coating onto cakes, burger buns, etc.

## PRODUCT INTRODUCTION

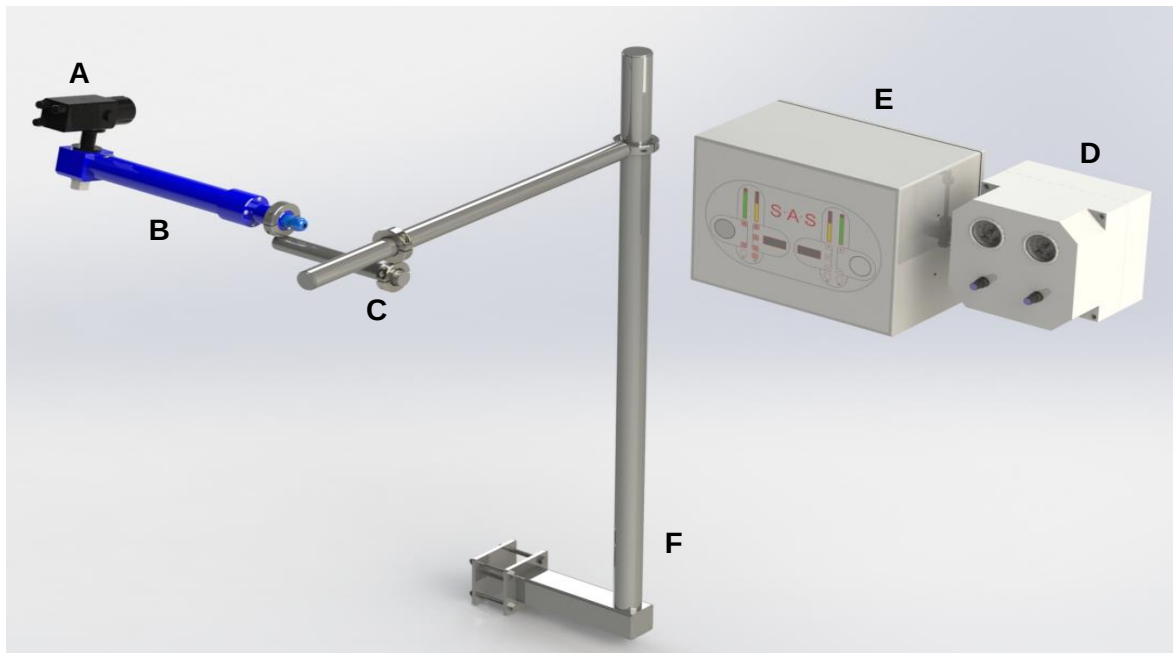
### Oil Application Model Type: SAS 10 & SAS 20

This model is designed to atomise mineral based Oils and create an electrostatic charge on the oil as it leaves the atomiser, which is angled and pointing onto the products to be coated.

The SAS Oil Applicator spray unit uses the principal of atomising the oil as it is atomiser by spraying air and electrical charge onto the oil, it is able to obtain the ultimate wrap-around effect, onto grounded product.

#### Please Note

This system is not suitable for applying highly conductive spray materials, such as water-based minerals. Please consult SAS for such applications.



**Fig 1**

### **SAS 10 – Oil Applicator overview**

| Pos. | Description                      | Assembly Number | Manual Reference     |
|------|----------------------------------|-----------------|----------------------|
| A    | Electrostatic Oil Atomiser Head  | OH 200-600      | See Page 31 - Fig 16 |
| B    | Electrostatic Oil Generator Head | OH 200-161      | See Page 29 - Fig 14 |
| C    | Support for Oil Generator Head   | GH 200-322      | See Page 37 - Fig 23 |
| D    | Electrostatic Controller         | CU 200-124      | See Page 28 - Fig 13 |
| E    | Pneumatic Control Box            | PB 200-133      | See Page 36 - Fig 21 |
| F    | Frame Mounting Assembly - Oil    | GH 200-320      | See Page 37 - Fig 24 |

**Note** *An SAS 20 Assembly contains one common Electrostatic controller (see Page 10, Fig 3)*

## INSTALLATION

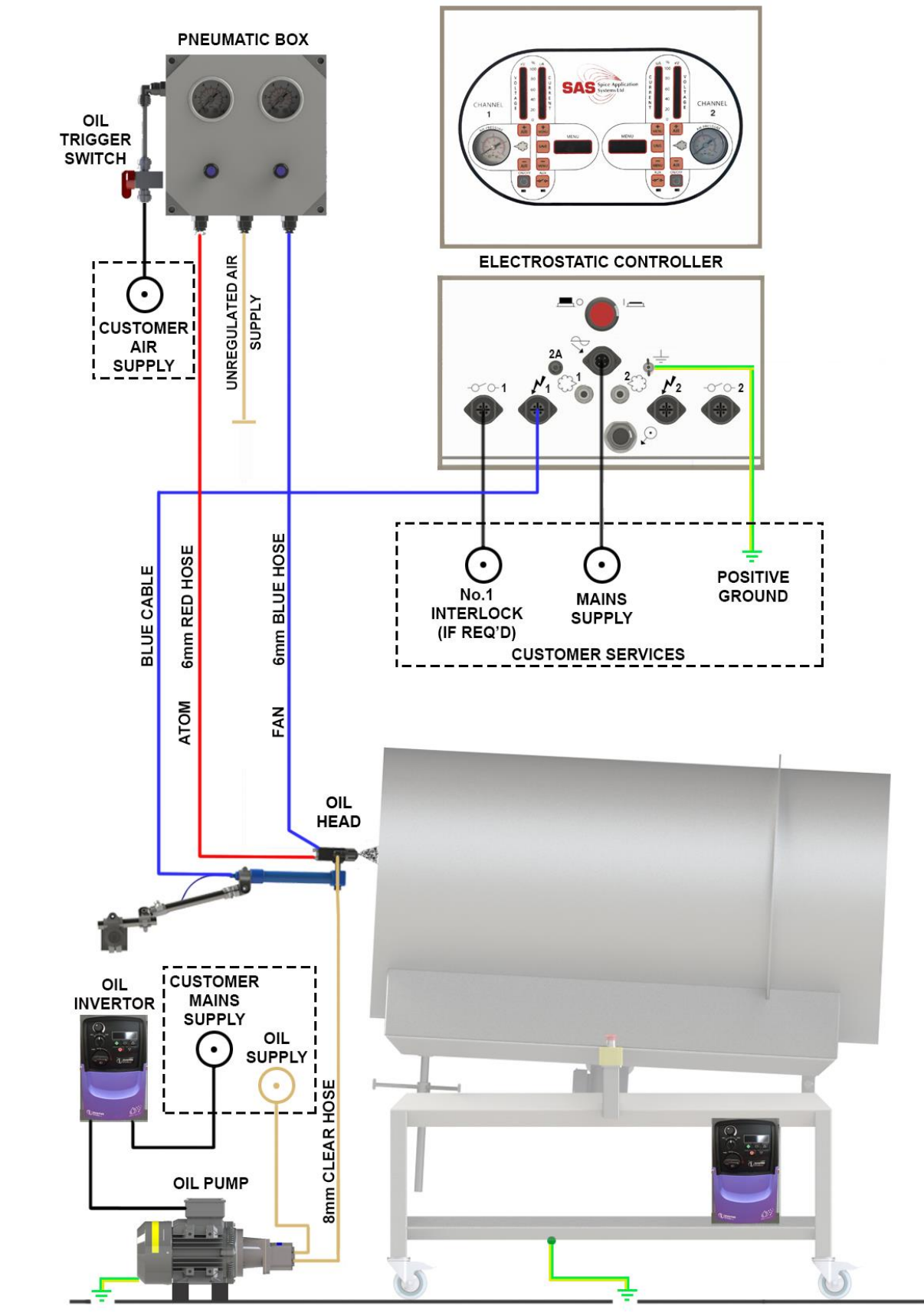
1. The Electrostatic control unit must be located outside the flavouring drum in a Non-Hazardous area at a location which allows the operators to observe the material atomisation in front of the tumbling product.
2. To obtain the maximum electrostatic efficiency, the product to be coated must be able to fully tumble and roll in front of the atomiser spray pattern. If it does not do so, this may result in a poor-quality finish to the product.
3. The appropriate distance between the atomiser and the product to be coated should be between 20 to 25cm (8" to 10")
4. Ensure that the distance between the electrode on the oil head and any surrounding metal objects (including the infeed tray and drum) is at least 15cm (6") or greater.
5. The Pneumatic control box must be located outside the flavouring drum at a location which allows the operators to observe the material atomisation in front of the tumbling product.
6. Ensure the Oil Head fluid nozzle and air cap are correctly fitted and hand tightened with the retaining ring onto the Oil head.
7. The Oil delivery system will determine the fluid flow rate to the applicator, which is adjusted by the oil pump controls. (see respective manual for Oil delivery system)
8. Ensure a suitable fluid delivery hose is installed between the Oil applicator and the delivery pump. The fluid hose connected directly to the Oil applicator must be non-conductive. It is recommended to use Food grade Polyethylene or Teflon hose.
9. The fluid delivery hose must be suitable for the materials being applied and the cleaning agents used for flushing. Also, the fluid hose must have a suitable working pressure rating for the system.
10. Depending upon the materials being applied, it may be required to install a fluid filter before and after the Oil pump to prevent the Oil applicator from blockages and protect the oil pump mechanism.
11. All pneumatic hoses connected to the atomiser must be non-conductive. It is recommended to use Polyethylene and not Nylon hose.
12. Never use damaged hoses, cables or connections.
13. All compressed air connections must be fitted with a local isolator and pressure regulator, plus fitted with a suitable Filter to ensure a Clean and Dry air supply to the SAS Equipment.
14. If the application requires the remote trigger to facilitate the unit to switch on and off with an existing production line, please refer to Page 12 – Fig 6 on the manual. If not using, make sure the dust caps are fitted and locked into place on the underside of the SAS Controller. (see Page 12 - Fig 5)



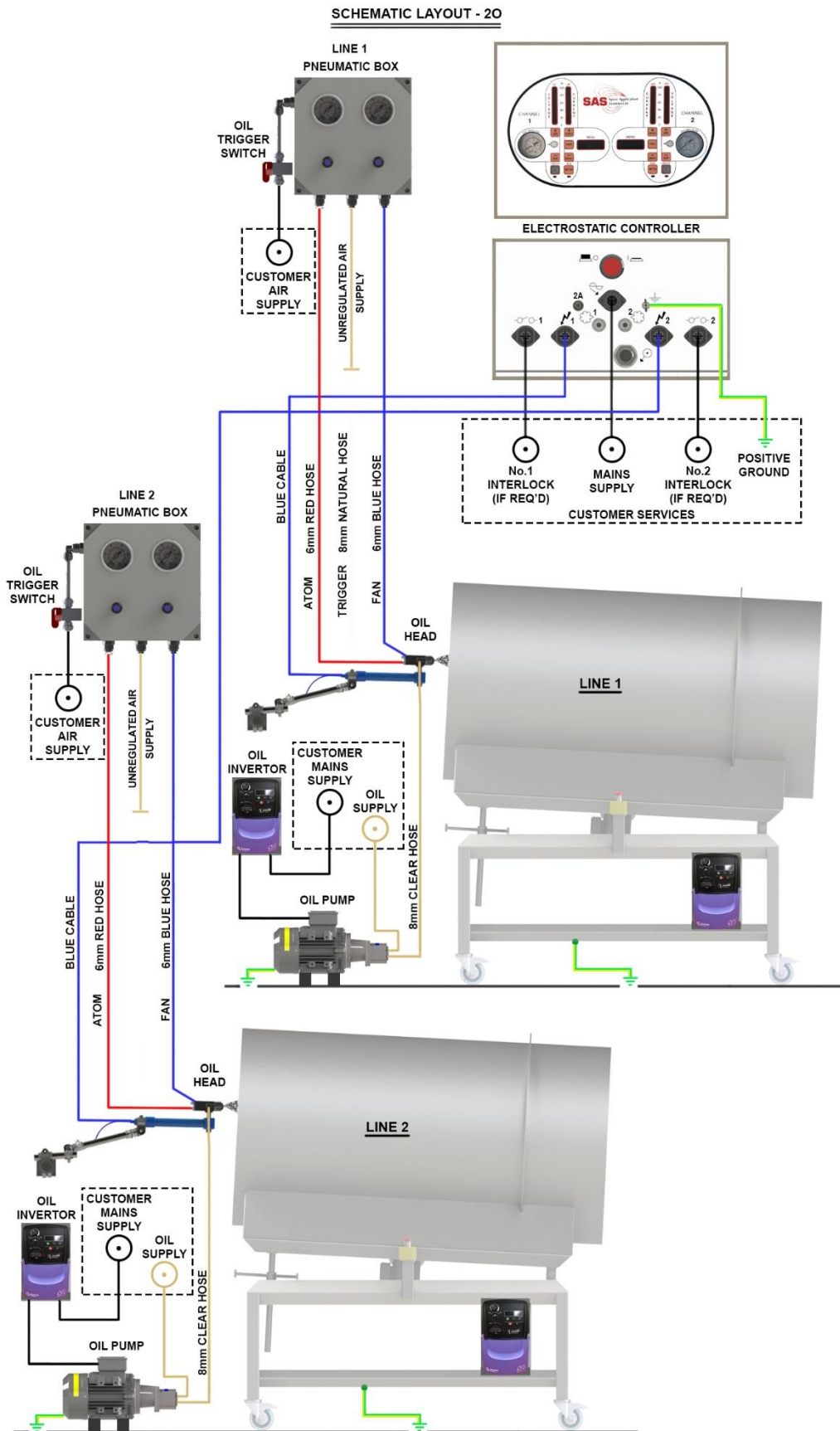
## INSTALLATION

15. Ensure all Earthing cables are connected and all other equipment in the application area is Grounded, including all mobile frames, within 3m (10ft) of the application area.
16. Remove all unnecessary metal components and materials from the application area.
17. Keep the application area clean.
18. The Electrical mains supply must be fitted with an earth wired to the factory mains earthing system.
19. 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 3mtrs of the drum.
20. All ground connections must be regularly checked and confirmed using a megohm meter for a resistance of 1 megohm or less from the structure to a positive ground. (i.e. floor bolt or building steelwork)
21. Any floor coating in the application area must be electrically conductive and grounded. Do not attempt to by-pass or defeat the ground connections as this may result in a hazardous condition.
22. Only personnel Trained and Qualified in the operation and service of Electrostatic equipment are permitted to work upon the Application equipment and installation.
23. Any Personnel working within the application area, must wearing conductive footwear. If personnel are required to wear gloves, these must also be conductive.
24. Ensure any Warning signs provided are prominently posted around the application area so all personnel can read and adhere to the safety instructions.
25. For all Interconnection details of the equipment, please refer to page 9 - Fig 2 or page 10 - Fig 3 for your appropriate application.

## SCHEMATIC LAYOUT - 10



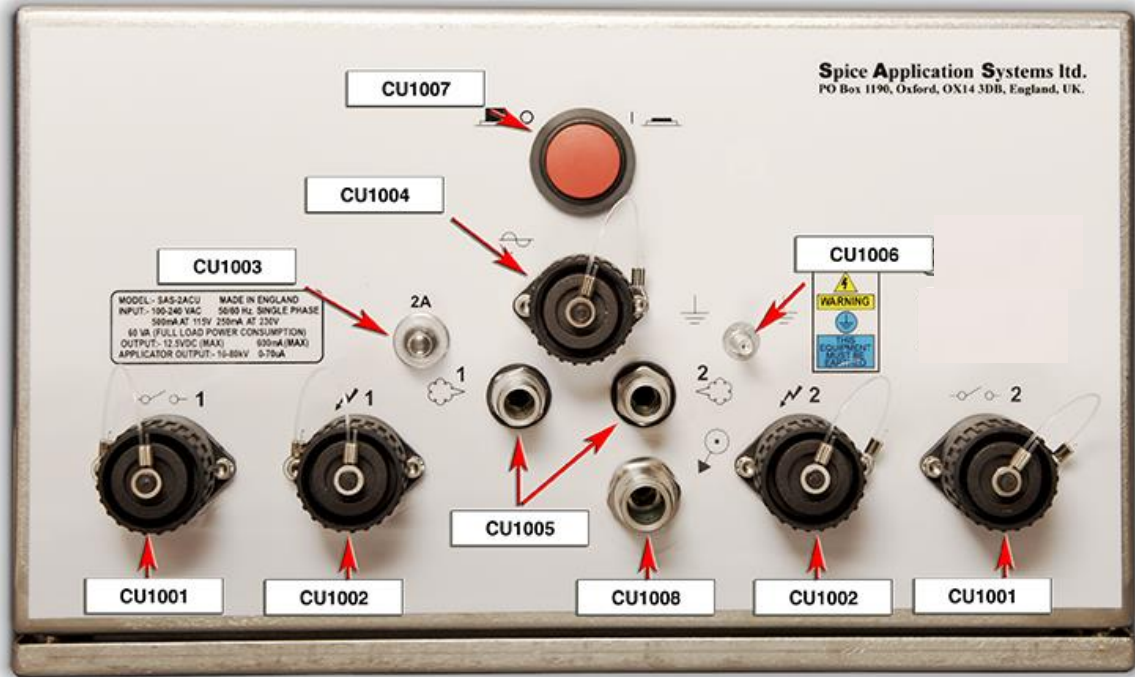
**Fig 2**



**Fig 3**

# INSTALLATION

## CONTROL UNIT – CONNECTION POINTS



**Fig 4**

| Position | Description                                                    |
|----------|----------------------------------------------------------------|
| 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   | Not required for 10 & 20 Applications                          |
| CU1006   | Terminal, Earth Post (IP65)                                    |
| CU1007   | Mains electric master on/off switch (IP65)                     |
| CU1008   | Not required for 10 & 20 Applications                          |

### NOTE

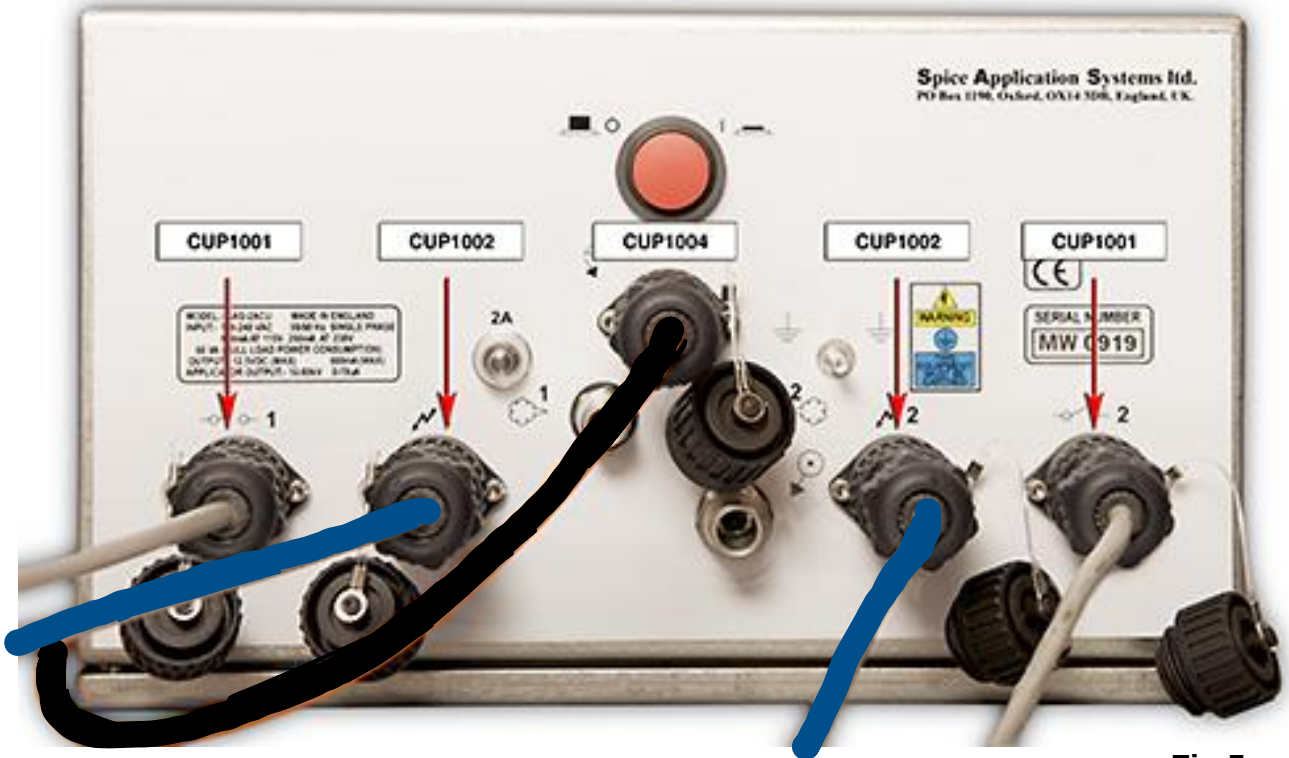
The terminals used in the mains connector on the control panel of the unit are:-

| <u>POLE</u>    | <u>PIN No.</u> |
|----------------|----------------|
| Live           | Pin 1          |
| Neutral        | Pin 3          |
| Earth / Ground | Pin E          |

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

# INSTALLATION

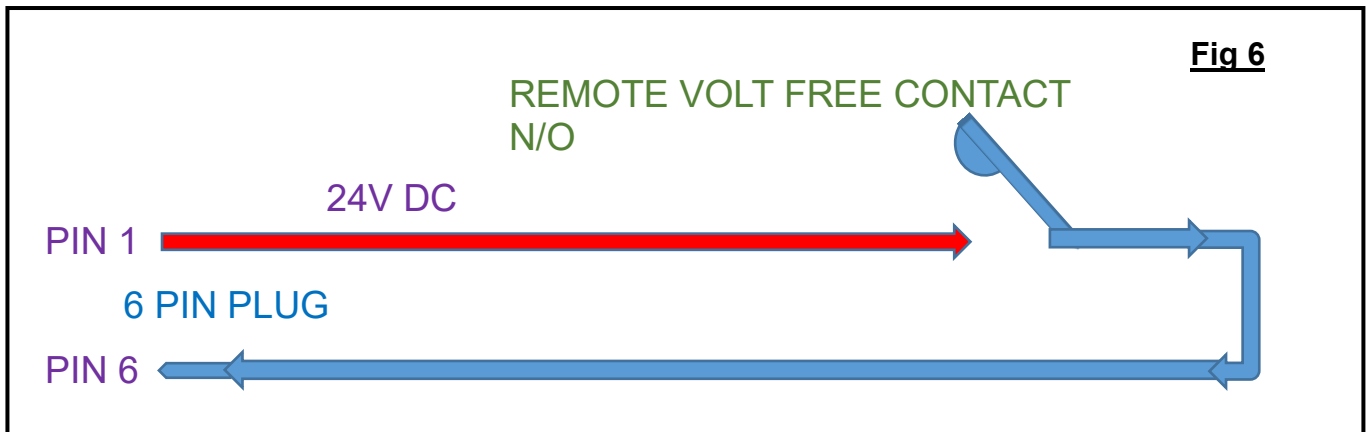
## CONTROL UNIT - PLUG IN CABLES



**Fig 5**

| Position | Description                                          |
|----------|------------------------------------------------------|
| 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)        |

## REMOTE TRIGGER WIRING (CUP1001)



**Fig 6**

### NOTE

Please refer to the instructions on page 16 for the correct programming of the remote trigger input signal for each channel.

# INSTALLATION

## 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>Designation</u> | <u>US/JAPAN</u> | <u>U.K.</u>  |
|----------------|--------------------|-----------------|--------------|
| Live           | <i>L</i>           | Black           | Brown        |
| Neutral        | <i>N</i>           | White           | Blue         |
| Earth / Ground | <i>E</i>           | 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.

### 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.**

# OPERATING PRINCIPLE

## ELECTROSTATIC

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

The generator head converts the 3.5 to 13 Vdc into a negative charge up to 85kV, which is transferred onto the material being applied which is then drawn towards the grounded product being coated.

The electrostatic oil head should be positioned towards the tumbling product inside the drum.

To obtain the maximum electrostatic efficiency, the product to be coated must be able to fully tumble and roll in front of the atomiser spray pattern. If it does not do so, this may result in a poor-quality finish to the product.

The appropriate distance between the atomiser and the product to be coated should be between 20 to 25cm (8" to 10")

## OIL HEAD ATOMISER

1. The part to be coated must be connected to the ground continuously.
2. Keep the atomiser clean.
3. Ensure the air nozzle, fluid nozzle and air cap are correctly fitted and the retaining ring is hand tight.
4. Ensure the atomiser is installed and positioned correctly.
5. Do not use the equipment if there is any air or fluid leaks.
6. Ensure that the product being coated does not come closer than 15cm (6") and no further than 25cm (10") from the atomiser.
7. The manual air valve for the Oil head atomiser is located on the side of the pneumatic box.
8. Atomisation and Fan regulation is set upon the Pneumatic box front regulators.
9. Round spray will be atomisation regulation. Flat spray will be atomisation and fan regulation.
10. Set the Atomisation and Fan air pressures for the atomiser to provide an even pattern at the minimum air pressure required.
11. Do not use excessive Atom & Fan air pressures as this will result in oil Misting outside of the coating drum.
12. Turn on the manual air valve to commence operation.

## OIL FLOW SYSTEM

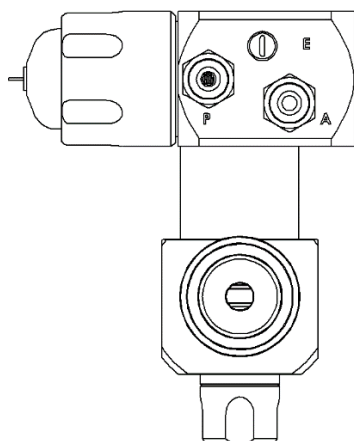
1. The Oil flow rate is determined and adjusted by the oil supply system.
2. Turn on the Oil Head followed by the oil supply system to prime the fluid delivery hoses with the coating material up to the oil Head.
3. Once the coating material is present at the oil head, turn off the oil supply system and then turn off the oil head trigger.



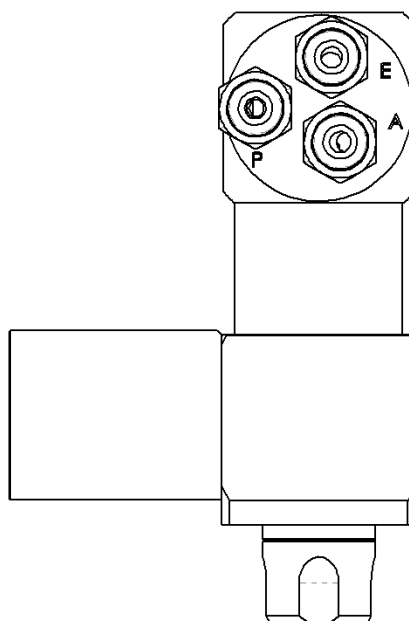
## OPERATING PRINCIPLE

### OIL HEAD CONNECTIONS – ROUND SPRAY

SIDE ENTRY PORTS



REAR ENTRY PORTS



**Fig 7**

| Position | Connection              | Function                       | Pressure Adjustment                               |
|----------|-------------------------|--------------------------------|---------------------------------------------------|
| <b>A</b> | Atomizing air           | Fineness of spraying           | P = 2 to 5 bar (29 to 72.5 psi)                   |
| <b>E</b> | Fan air<br>(flat spray) | Fan width : - Narrow<br>- Wide | P = 0<br>P = 1 to 4 bar (14.5 to 58 psi)          |
| <b>P</b> | Oil Supply Inlet        | Connection of Oil material     | P = Fluid Flow adjustment<br>upon Oil supply/pump |

#### NOTE

It is recommended that a record is kept by the customer for the different applicator settings and pressure values relating to the application process for specific products and materials being applied.

It is also recommended that a simple chart of these settings is printed and posted local to the SAS controller for your Operator's reference.



# OPERATING PRINCIPLE

## REMOTE OPERATION MEMORY

The SAS Control unit can hold in memory 100 different Menu numbers for air pressure and remote operation settings, this is so you can easily change the pressure for different applications and production rates.

For the 1OH/2OH operation, the air pressure adjustments are not required. These are found on the Pneumatic Box controls for Atom and Fan.

Within the SAS Control unit memory, you can select within each Menu number, to operate the Electrostatics from a remote volt-free signal (see page 12, Fig 6) This allows for each Channel on the unit to be independently switched On or Off from a remote source, providing the selected Menu number is pre-programmed for this function.

## Programming of Menu for Remote Operation settings

(see Page 17 - Fig 8 for reference)

1. Turn on mains power to the unit.
2. Select the Channel and the Menu program number to be programmed for Remote operation.  
Press button **4** or button **5** to scroll between the Menu numbers.
3. To program Remote operation for the selected Menu number/Channel, press button **Aux** button (**7**). The LED light below will turn Green.
4. Once the Remote operation is selected, the menu display will "Flash" until the new setting is Saved.  
To save the Remote operation to the memory, press the **SAVE** button (**11**) twice to store into the selected Menu number memory.
5. Once a Menu number is programmed for Remote operation, the unit will await the signal from the remote source. Once the remote signal is received, the LED light below the **AUX** button (**7**) will turn Red and the Electrostatics will be turned on. Once the remote signal is removed, the LED light below the **AUX** button (**7**) will turn back to Green.
6. To now use the programmed Menus, press buttons **4** & **5** to scroll through the Menu settings.
7. To review the Remote operation setting in each Menu, scroll through the Menus by pressing either button **4** or button **5** and observe the LED light status below the **Aux** button (**7**) for each Menu number.

If the adjustments are not saved correctly within the memory, the unit will default to the previous settings for the Menu number selected.

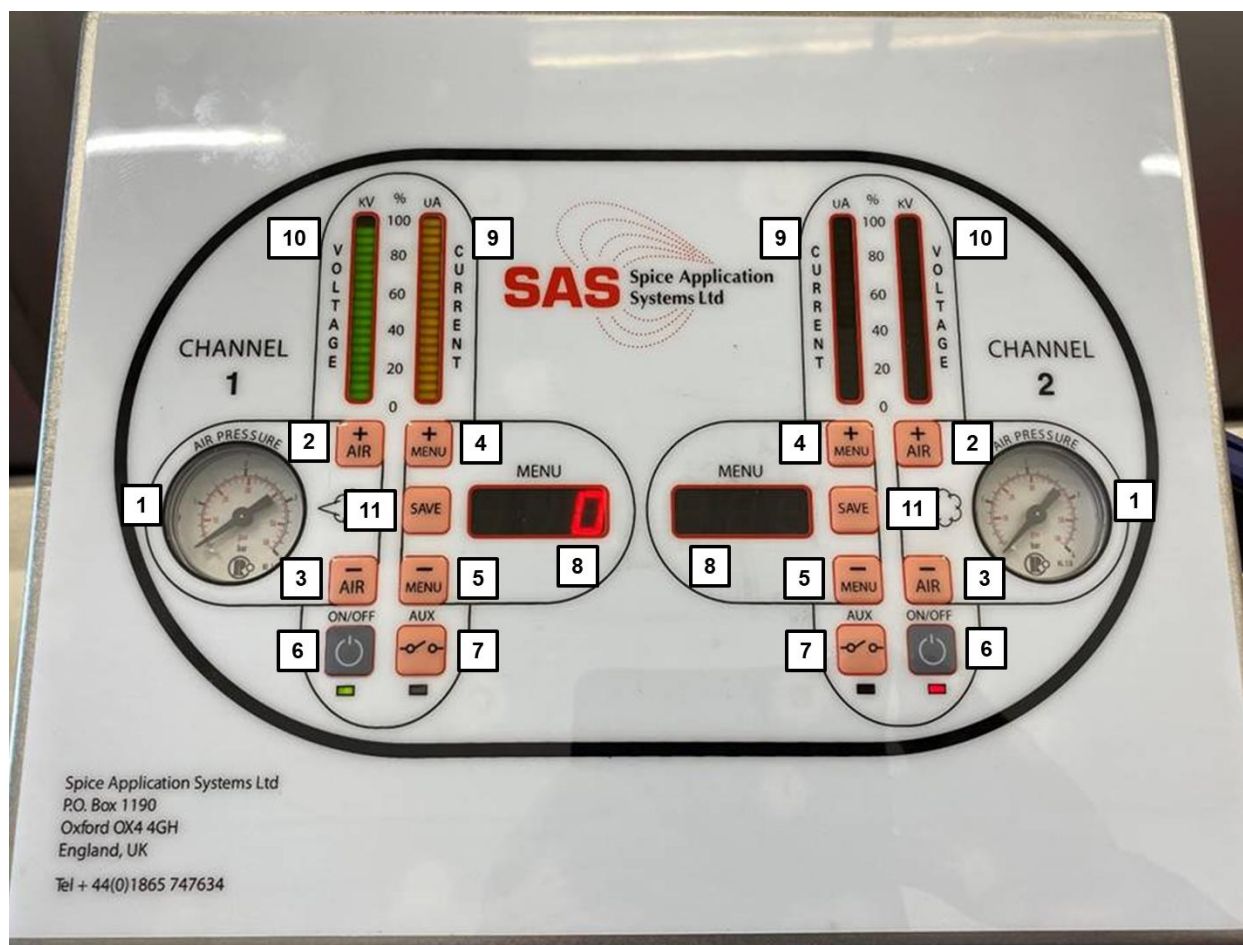
## NOTE

It is recommended that a record is kept by the customer for the different production settings relating to the application process for specific products and materials being coated.

It is also recommended that a simple chart of these settings is printed and posted local to the SAS controller for your Operator's reference.

# OPERATING PRINCIPLE

## CONTROL UNIT - FRONT PANEL



**Fig 8**

| Position | Title               | Description                                             |
|----------|---------------------|---------------------------------------------------------|
| 1        | <b>Air Pressure</b> | 0-4 bar Pressure gauge                                  |
| 2        | <b>+ Air</b>        | Pressure regulator adjustment + (increase air pressure) |
| 3        | <b>- Air</b>        | Pressure regulator adjustment - (decrease air pressure) |
| 4        | <b>+ Menu</b>       | Menu number selection (up +)                            |
| 5        | <b>- Menu</b>       | Menu number selection (down -)                          |
| 6        | <b>On/Off</b>       | Local on/off switch                                     |
| 7        | <b>Aux</b>          | Remote trigger on/off switch                            |
| 8        | <b>Menu</b>         | Menu Number display                                     |
| 9        | <b>uA</b>           | Microamp meter (orange)                                 |
| 10       | <b>kV</b>           | Kilovolt meter (green)                                  |
| 11       | <b>Save</b>         | Lock selection button                                   |

# START UP

## ELECTROSTATIC CONTROLLER

1. Connect the SAS control to its electrical power source.
2. Turn the main power-supply ON/OFF switch to the ON position (see page 11 - Fig 4, CU1007).
3. To turn on the electrostatic effect, press the Local ON/OFF button on the panel facia (see page 17 - Fig 8, position 6). The LED light below the button will turn from Red to Green and the Kilovolt and Microamp dials will be illuminated.
4. The power supply emits a self-regulating voltage to the generator head from 3.5 to 13 Vdc. This regulated voltage is transformed into high voltage by the cascade within the generator head and transported to the applicator electrode.

## PNEUMATIC CONTROL BOX

1. Supply the SAS Pneumatic control with clean dry compressed air minimum 6 bar (87 psi).
2. The compressed air connection must be fitted with a local isolator and a pressure regulator, plus fitted with a suitable Filter to ensure a Clean and Dry air supply to the SAS equipment.

## OIL APPLICATION ADJUSTMENT

1. Ensure the air nozzle, fluid nozzle and air cap are correctly fitted and the retaining ring is hand tight.
2. Turn on the Oil supply system to Prime the fluid lines with coating material up to the Oil head, ensure any trapped air is removed.
3. Adjust the Oil Supply system flow rate to provide the required volume of material. Conduct a flow rate test at the Oil head without any Atom and Fan air pressure. Collect the Oil flow rate into a measuring jug for one minute and record the volume and settings.
4. Adjust the Oil head Atomisation and Fan air pressures on the respective Pneumatic Control box regulators (see page 15 - Fig 7)
  - Adjust the Atomising air pressure (A - Atom air) to atomise the oil
  - Adjust the Fan air pressure (E - Fan air) to increase the Fan pattern (flat spray)
5. Observe the Oil head is atomising the material inside the Drum using the minimum amount of air pressure required to atomise. Excessive air pressures will result in oil Misting outside the drum.
6. Do not use the equipment if there is any air or fluid leaks.
7. Ensure the atomiser is installed and positioned correctly.
8. Ensure that the product being coated does not come closer than 15cm (6") and no further than 25cm (10") from the atomiser.
9. To obtain the maximum electrostatic efficiency, the product to be coated must be able to fully tumble and roll in front of the atomiser spray pattern. If it does not do so, this may result in a poor quality finish to the product.
10. The appropriate distance between the atomiser and the product to be coated should be between 20 to 25cm (8" to 10")

11. Be sure that the distance between the electrode on the oil head and any surrounding metal objects (including the infeed tray and drum) is at least 15cm (6") or greater.
12. If required, adjust the rotational speed and angle of the Drum unit to ensure the product is tumbling but without causing damage.
13. Electrostatic effect.

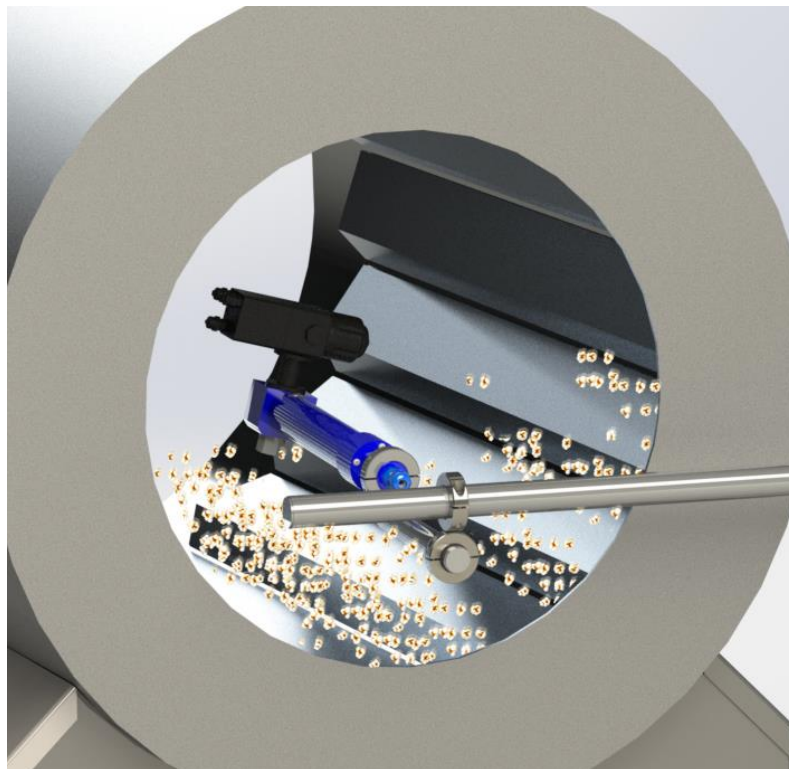
The high voltage is shown in Green and will automatically adjust to the maximum allowed for the application conditions.

The microamps is shown in Yellow also is automatically set depending upon the application conditions.
14. Follow the Static Electricity Test (S.E.T.) as described on page 20, to check the Electrostatic field within the application area.

## NOTE

The electrostatic efficiency decreases quickly when application head or hoses are dirty or damp. This will lead to poor quality finished product. Please ensure the Applicator, Generating head and all supply hoses and cables remain dry.

## Typical set-up image



**Fig 9**

# STATIC ELECTRICITY TEST

## STATIC ELECTRICITY TESTER

Part No. 100-166



## INSTRUCTIONS

**Always “self-test” the tester (S.E.T) before you start.**

Do this by touching both ends simultaneously.

A bright Red light should illuminate indicating that the S.E.T. is functioning correctly.

## ELECTROSTATIC TEST

1. Turn on the electrostatic generating head.
2. **Always make sure you are holding onto an earthing point when doing this test, and you are wearing conductive shoes.**
3. Hold the S.E.T. with the screwdriver tip between the fingers. With the handle end pointing towards the generating head, about 1m 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 40-50cm (16”-20”) from the electrode.
4. If no red light appears then no static field is detected, refer to the Troubleshooting section of this manual.

## CLEANING METHOD

### WARNING



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



All metallic parts located within and around the applicator head must be correctly connected to the ground. Any floor coating must be electrically conductive and grounded.



Do not stand upon wooden pallets or a non-grounded structure while cleaning.



**DO NOT USE HIGH PRESSURE CLEANING SYSTEMS ON THE APPLICATION EQUIPMENT AND CONTROLS.**

## CLEANING PROCEDURE

- The ON/OFF switches on the power supply and to the applicator head must be OFF position before starting cleaning operation.
- Wait for 10 seconds before entering the spray area.
- Only apply a moderate amount of cleaning solution onto a clean soft cloth, or bristle brush, to clean the applicator, generator head and hoses.
- Hose down the complete system in place (CIP). There is no need to remove the system for cleaning
- Wash thoroughly and dry completely with low pressure compressed air at 2 bar (29psi)
- Wipe dry the atomisers, generator heads, vibratory tray/drive assemblies, plus all hoses and cables carefully and thoroughly, before commencing production.



**CAUTION:** Synesthetic resins used in the fabrication of the electrostatic Atomiser can react with certain cleaning agents. Check with Spice Application Systems.



**CAUTION:** avoid using the most toxic cleaning agents. Do not use chlorinates.



**THIS IS VERY IMPORTANT.**

**IF NOT DRY IT CAN LEAD TO MATERIAL BUILD UP ON THE EQUIPMENT.  
NEVER SWITCH ON THE ELECTROSTATICS WITH ANY CLEANING  
MATERIALS REMAINING IN THE SYSTEM.**

### Before switching the electrostatic back ON, please check:

1. Check that the atomisers, generator heads, vibratory tray/drive assemblies, plus all hoses and cables are completely dry.
2. Check that all equipment within the application area is correctly installed and positioned.

## SERVICING OVERVIEW

### WARNING



The personnel involved in the electrostatic coating system servicing must be trained and qualified. If you face any troubles which cannot be repaired after consulting the Troubleshooting and Maintenance guides, do not try to start the equipment. Consult your local authorised SAS distributor or SAS directly for assistance.

1. The electric power supply must be disconnected before any servicing operation **(power supply unit switched off and isolated)**.
2. When turning off the Voltage, wait for 10 seconds before commencing work, so that any electrostatic charge has time to reach ground.
3. **Before disconnecting hoses, ensure that the system is no longer pressurized, the air is turned off and that the electric current is also switched off.**
4. Do not soak or immerse the applicator, generator head or any plastic parts in a solvent. This could result in damage and impair the safety circuits. If necessary, clean any plastic parts with a soft brush soaked in a soapy water solution, after hosing down and then wipe dry immediately.
5. Never leave components of the applicator and generator head immersed in cleaning solution.
6. Never use metal tools to clean the applicator and generator head.
7. Always store in a dry place.
8. After any repair and prior to turning on the power supply:
  - a. Ensure the atomiser and generator head is correctly installed and positioned onto the application unit.
  - b. Ensure all Earth wires are in place and positively connected to ground.

# **SERVICING ROUTINE**

## **DAILY CHECKS (start of every shift)**

1. Check the condition, wipe clean and dry the Oil Head and electrode.
2. Check the condition, wipe clean and dry the Generator head.
3. Check the condition and operation of the Oil delivery system.
4. Check All hoses are in good condition (not worn or crimped) ensuring there are no leaks and connections are tight.
5. Check All electrical cables are in good condition (not worn or crimped) ensuring they are not broken, twisted or knotted and connections are tight.
6. Check All earthing wires are connected to the equipment and support frames including the Vibratory trays and Drum are connected correctly.
7. Check the SAS Controller for correct operation of the Voltage & Microamp meters.
8. Conduct an S.E.T. test to check the electrostatic effect.

## **WEEKLY CHECKS (every 7 days)**

1. Check the working condition of the Oil delivery system. Please refer to the Oil Supply system Manual for instructions.
2. Check the condition of any Anti-Vibration feet used with the system. Should the Anti-Vibration feet require attention, please refer to the respective service Manual for instructions.
3. Check the Oil Flow Rate at the output from the Oil supply system. Conduct a flow volume test.
4. Check the compressed air supplies to the equipment to ensure the correct input pressures and that the air supply is Clean & Dry.
  - SAS Controller @ 4 bar (58psi)
  - Pneumatic Control box @ 6-8 bar (87-120 psi)
5. Check the electrical resistance to ground of All earthing wires are connections within 3 meters of the application area. This should be checked with a Megaohm Meter and the resistance to ground should measure 1 megohm or less.

## **BI-ANNUAL CHECKS (every 6 months)**

1. Check and replace if required, the Oil Head Electrode.
2. Check and replace if required, the Oil Head air cap and fluid Nozzle.



# SERVICING APPLICATOR

## OIL HEAD - CLEANING

1. Never immerse the oil head in solvent of cleaning fluids.
2. Do not use metal tools to clean the oil head or the air cap holes, as they scratch and distort the spray pattern.
3. Only use soft cloth or soft bristle brushes.
4. Clean the front of the oil head and the fluid nozzle with the oil head tip pointed downwards to prevent dirty cleaning materials entering the air and fluid passages.
5. Make sure that the fluid passages have been released of and fluid pressure from the oil supply system.
6. Remove the Air cap retaining ring and the air cap from the oil head.
7. Clean them with a soft bristle brush and some cleaning solution (do not leave immersed in cleaning solution)
8. Using compressed air, blow through the holes in the air cap from rear (inside) of the air cap & fluid nozzle.
9. **IMPORTANT** Check the electrode condition on the oil head. Never start the oil head in production if the electrode is damaged or broken.
10. After cleaning, store in a dry location or reinstall onto the oil head.
11. Before switching on the electrostatic effect, ensure the fluid nozzle, air cap and electrode are correctly and securely positioned with the retaining ring.

## OIL HEAD – REPLACEMENT

### **Disassemble oil head from the generator head.**

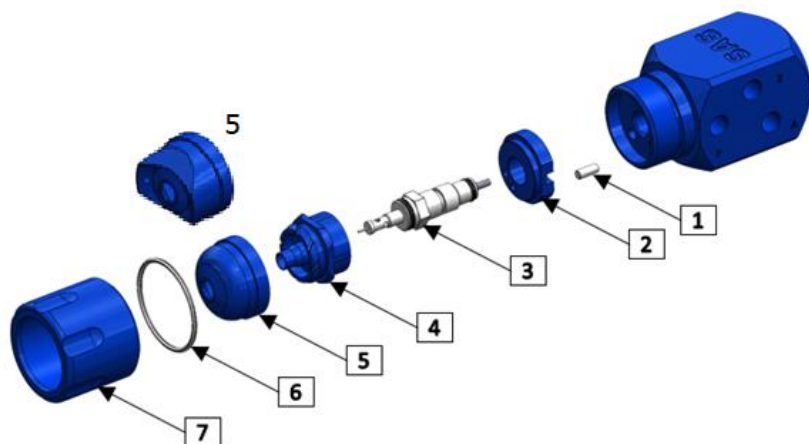
1. Unscrew shaft nut (2) and remove the oil head (1)
2. Replace O ring (5)
3. Apply dielectric grease on the shaft of the new oil head (3) and O Ring (5)
4. Insert new oil head shaft into the generator head (4) ensuring the O ring (5) is correctly located in groove.
5. Re install the screw shaft nut (2) and tighten by hand when the gun is in the correct location.



**Fig 10**

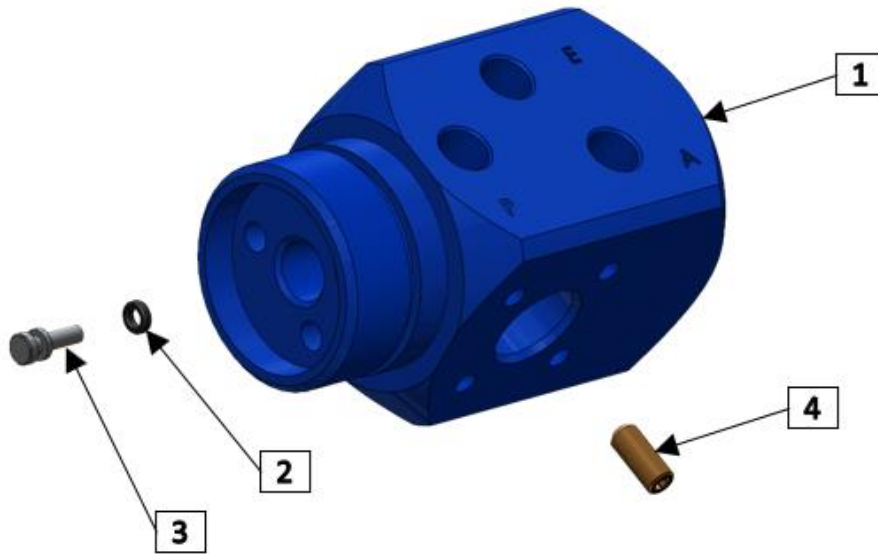
# SERVICING APPLICATOR

## OIL HEAD – ASSEMBLY



| Position | Description                                 | Part Number |
|----------|---------------------------------------------|-------------|
| 1        | Dowel                                       | OH 100-644  |
| 2(a)     | Baffle Plate - Non-Separating – Round Spray | OH 100-628  |
| 2(b)     | Baffle Plate – Separating – Fan Spray       | OH 100-636  |
| 3        | Nozzle Assembly                             | OH 100-619  |
| 4        | Fluid Nozzle                                | OH 100-618  |
| 5(a)     | Air Cap – Round Spray                       | OH 100-616  |
| 5(b)     | Air Cap – Fan Spray                         | OH 100-635  |
| 6        | O Ring - 38x2                               | OH 100-641  |
| 7        | Retaining Ring                              | OH 100-617  |

## BODY CONTACT



| Position | Description               | Part Number |
|----------|---------------------------|-------------|
| 1        | Body with side ports      | OH 100-621  |
| 2        | O Ring – 3 x 1.5          | OH 100-640  |
| 3        | Needle contact            | OH 100-626  |
| 4        | SS grub screw – M5 x 12mm | OH 100-646  |

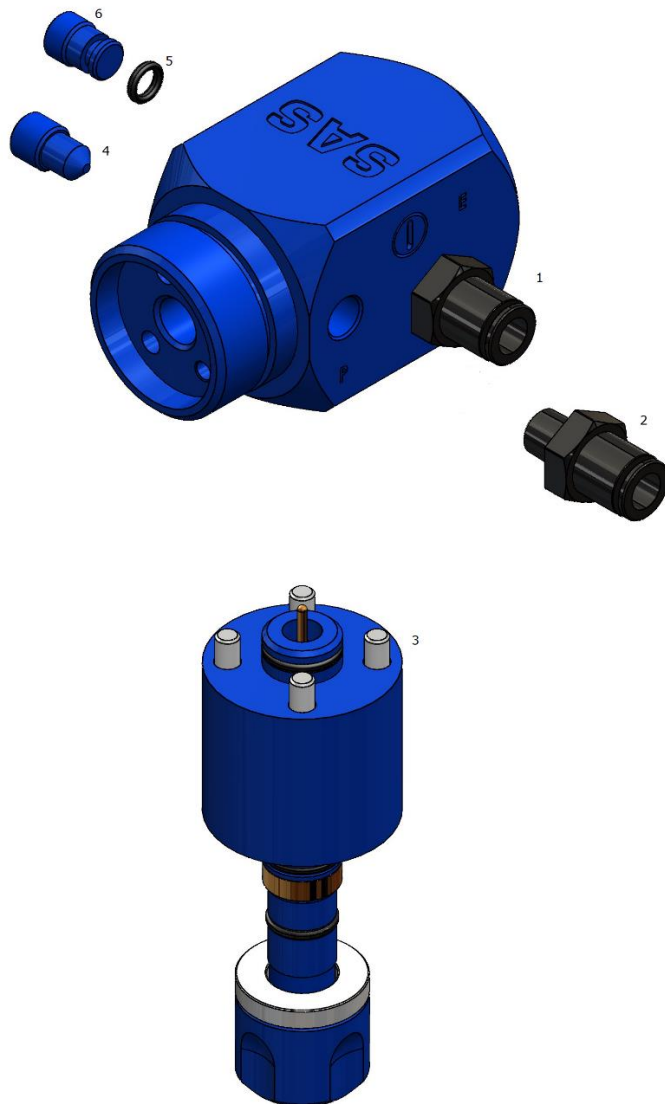
## PORT PLUGS



| Position | Description                           | Part Number |
|----------|---------------------------------------|-------------|
| 1        | Fluid plug – Port P                   | OH 100-629  |
| 2        | O Ring                                | OH 100-638  |
| 3        | Air plug – Ports A and E, as required | OH 100-630  |

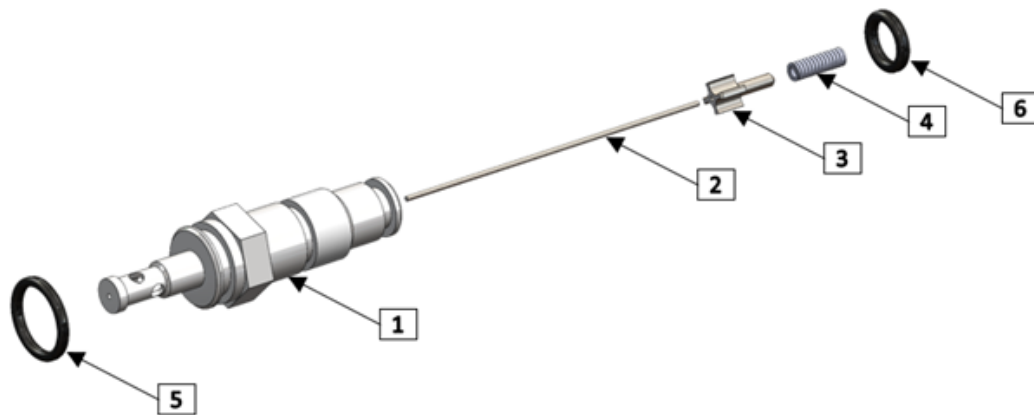
NOTE: Port designations see Page 14

## SHAFT TO BODY ASSEMBLY AND TUBE PUSH FITTINGS



| Position | Description                            | Part Number |
|----------|----------------------------------------|-------------|
| 1        | Port A and E, if required - 6mm x 1/8" | OH 100-649  |
| 2        | Port P - 8mm x 1.8"                    | OH 100-648  |
| 3        | Socket Cap Screw M5x35LG               | OH 100-643  |
| 4        | Fluid plug – Port P                    | OH 100-629  |
| 5        | O Ring                                 | OH 100-638  |
| 6        | Air plug – Ports A and E, as required  | OH 100-630  |

## NOZZLE ASSEMBLY



| Position | Description                | Part Number |
|----------|----------------------------|-------------|
| 1        | Nozzle                     | OH 100-623  |
| 2        | SS Electrode (length 58mm) | OH 100-625  |
| 3        | Wire retainer              | OH 100-624  |
| 4        | Needle contact spring      | OH 100-633  |
| 5        | O Ring - 10.82x1.78        | OH 100-637  |
| 6        | O Ring – 7x2               | OH 100-639  |

## POST ASSEMBLY

|  | Position | Description              | Part Number |
|--|----------|--------------------------|-------------|
|  | 1.       | Shaft                    | OH 100-613  |
|  | 2.       | Contact rod – 48mm       | OH 100-627  |
|  | 3.       | Post plunger spring      | OH 100-632  |
|  | 4.       | Contact pin              | OH 100-615  |
|  | 5.       | Retainer screw           | OH 100-614  |
|  | 6.       | Post ring contact spring | OH 100-634  |
|  | 7.       | Contact ring             | OH 100-620  |
|  | 8.       | O Ring - 10.82x1.78      | OH 100-637  |
|  | 9.       | O Ring - 12.42x1.78      | OH 100-642  |
|  | 10.      | O Ring - 12.42x1.78      | OH 100-642  |
|  | 11.      | Washer                   | OH 100-612  |
|  | 12.      | Shaft nut                | OH 100-611  |
|  | 13.      | O Ring - 12.42x1.78      | OH 100-642  |

## TROUBLESHOOTING

| PROBLEM                                      | PROBABLE CAUSE                                            | SOLUTION                                                                                                                            |
|----------------------------------------------|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <b>Unit will not operate</b>                 | Mains connector not fitted to control panel               | Connect to rear of control panel (see page 12 - Fig 5, CUP1004)                                                                     |
|                                              | Not connected to a suitable mains electrical supply       | Engineer to check supply (see page 13)                                                                                              |
|                                              | Not switched "ON"                                         | Turn the switch "ON" at the control panel (see page 11 - Fig 4, CU1007)                                                             |
|                                              | Circuit breakers tripped at the rear of the control panel | Press circuit breakers inwards (see page 11 - Fig 4, CU1003) If they trip out again after turning on the unit call for an engineer. |
| <b>Jerking or spitting spray.</b>            | Air is being sucked into material stream.                 | Check pump suction hose for leaks and tighten fittings.                                                                             |
|                                              | Insufficient fluid pressure.                              | Increase pump fluid pressure and/or clean fluid filter.                                                                             |
|                                              | Dirt in the fluid line.                                   | Clean the fluid line and filter.                                                                                                    |
|                                              | Not enough fluid in the container.                        | Fill the fluid container.                                                                                                           |
| <b>No fluid flow rate.</b>                   | Nozzle blocked. Dirt in the fluid being applied.          | Clean air cap and nozzle (see page 24)<br>Use a finer fluid filter or replace a damaged filter.                                     |
|                                              | Fluid filter clogged. Low fluid pressure.                 | Clean it. Increases pump air pressure/check the fluid filter.                                                                       |
| <b>Fluid leaks through holes in air cap.</b> | Nozzle badly screwed into the body.                       | Clean the air cap and nozzle (see page 25 – Fig 11)<br>Check for fluid flow back into the air passages.                             |
| <b>Poor atomization.</b>                     | Nozzle obstructed or worn out. Low fluid pressure.        | Clean nozzle or replace it (see page 24)<br>Increase pumps fluid pressure.                                                          |
|                                              | Fluid viscosity too high.                                 | Reduce viscosity by heating material where appropriate                                                                              |
|                                              | Atomizing air pressure too low.                           | Increase atomizing air pressure (see page 15 – Fig 7)                                                                               |



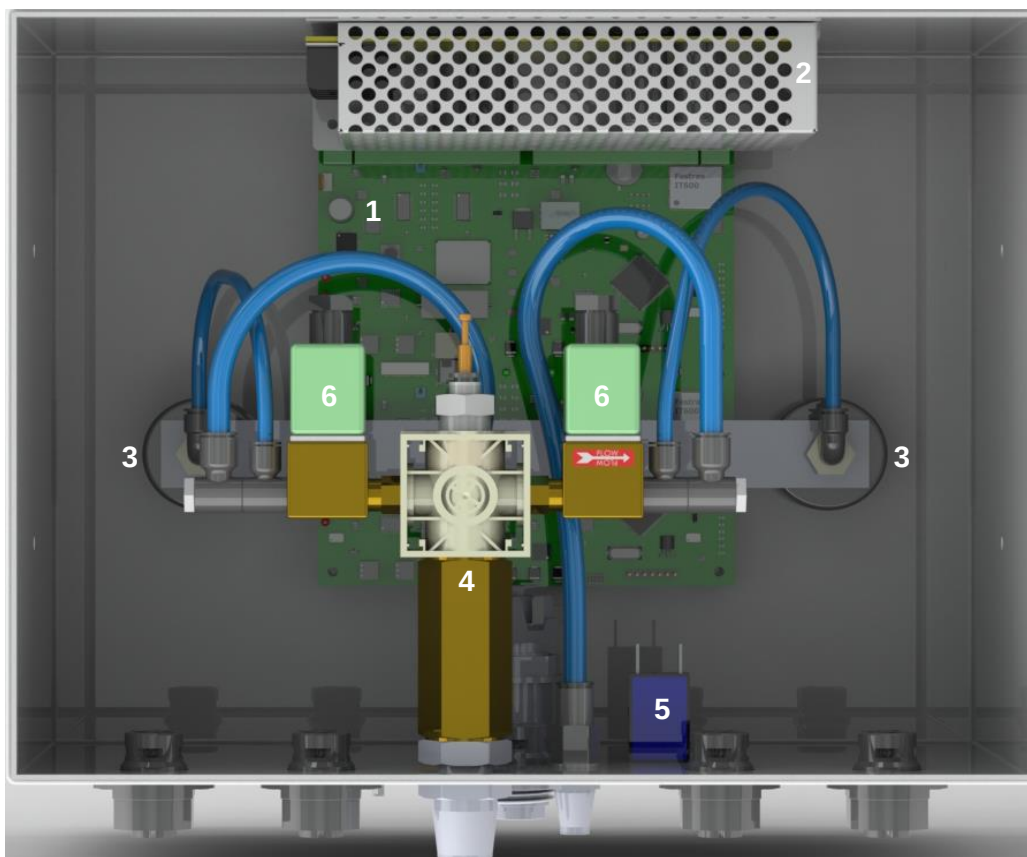
## TROUBLESHOOTING

| PROBLEM                                                                 | PROBABLE CAUSE                                    | SOLUTION                                                                                                       |
|-------------------------------------------------------------------------|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| <b>Excessive delivery in middle of spray (spray fan is not uniform)</b> | Excessive fluid flow rate                         | Reduce fluid flow rate.<br>Increase atomizing air pressure (see page 15 – Fig 7)                               |
|                                                                         | Fluid viscosity too high.                         | Reduce fluid viscosity                                                                                         |
|                                                                         | Air holes in air cap obstructed.                  | Clean air cap, blow air holes, clean with compressed air (see page 24)                                         |
| <b>Oil spraying, poor adhesion to product</b>                           | Voltage output too low                            | Adjust the Applicator further away from the product (see page 18)<br>Conduct SET test (see page 20)            |
|                                                                         | Earthing not correct                              | Reset the earth wiring and contacts                                                                            |
|                                                                         | Oil not suitable for electrostatic application    | Contact Oil supplier                                                                                           |
| <b>Partial or missed coating of product</b>                             | Applicator incorrectly positioned in the drum     | Set to correct position facing the tumbling product. In excess of 20cm (8") away from ground (see pages 7 & 8) |
|                                                                         | Insufficient Oil output                           | Increase oil pump output.<br>Refill Oil tank.                                                                  |
|                                                                         | Flavouring drum speed/angle                       | Increase or decrease drum speed.<br>Raise or lower drum angle.                                                 |
| <b>Overspray in the Factory (dusting)</b>                               | Electrostatics are not turned on                  | Turn on at the control (see page 18)<br>Conduct SET test (see page 20)                                         |
|                                                                         | The low voltage cable not connected or is damaged | Replace cable if needed.<br>(This cable must be supplied by SAS).                                              |
|                                                                         | Earthing not correct                              | Reset the earth wiring and contacts.                                                                           |
|                                                                         | Atomisation very fine (misting)                   | Reduce Atomisation air pressure (see pages 7 & 8)                                                              |
|                                                                         | Air pressure too high                             | Turn down Atomisation air & Fan air pressures.<br>(see page 15 – Fig 7)                                        |
| <b>Operators are getting static electricity shocks</b>                  | Earthing not connected                            | Reset the earth wiring and contacts to all equipment.                                                          |
|                                                                         | Operator not wearing conductive clothing          | Purchase conductive foot gear, or conductive operator earthing straps.                                         |

## SPARE PARTS

### ELECTROSTATIC CONTROLLER

Assembly Number : CU 200-124



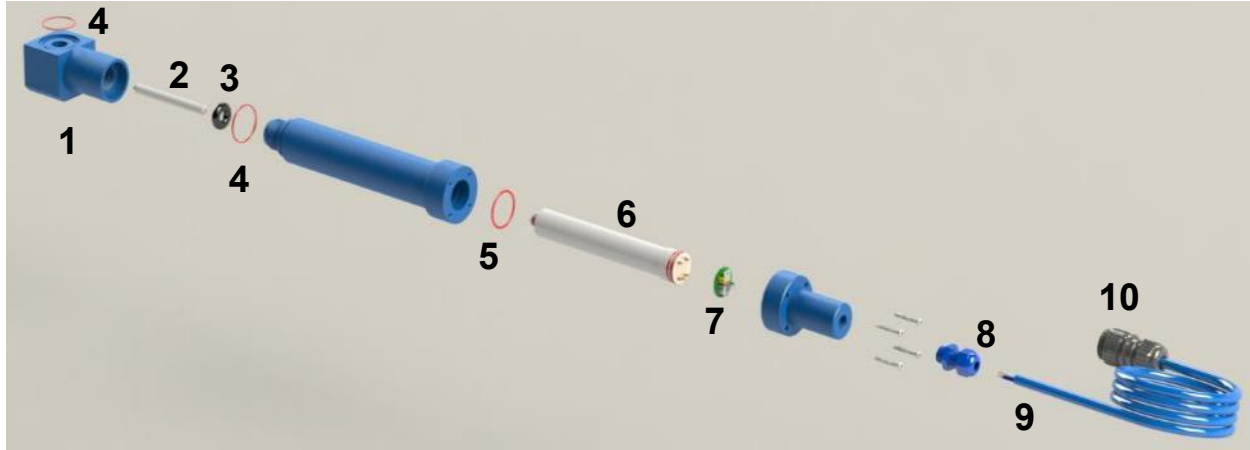
**Fig 13**

| Position | Description                | Part Number |
|----------|----------------------------|-------------|
| 1        | Main Control PCB           | CU 100-003  |
| 2        | Power Supply               | CU 100-004  |
| 3        | Air Gauges                 | CU 100-055B |
| 4        | Mains Pressure Regulator   | CU 100-002  |
| 5        | Mains Fuse                 | CU 100-018  |
| 6        | Regulating Solenoid Valves | CU 100-005  |

## SPARE PARTS

### ELECTROSTATIC GENERATING HEAD – OIL

Assembly Number : OH 200-161



**Fig 14**

| Position | Part Number | Description                                          |
|----------|-------------|------------------------------------------------------|
| 1        | GH 100-068  | Oil Cap                                              |
| 2        | GH 100-169  | Oil Electrode assy                                   |
| 3        | GH 100-074  | Black Electrode "O" Ring                             |
| 4        | GH 100-080F | Red Seal "O" Ring (Front) – 2 places                 |
| 5        | GH 100-080R | Red Seal "O" Ring (Rear)                             |
| 6        | GH 100-076  | Cascade MK3                                          |
| 7        | GH 100-077  | Oscillator board MK3                                 |
| 8        | GH 100-075  | Cable Gland                                          |
| 9        | GH 100-072  | Cable MK3                                            |
| 10       | GH 100-073  | Electrostatic generating head plug 4 pin Male (IP65) |

## SPARE PARTS

### SPARES KIT (GENERATING HEAD – OIL)

Assembly Number : OH 200-128



**Fig 15**

| <u>Position</u> | <u>Description</u>                | <u>Part Number</u> | <u>Quantity</u> |
|-----------------|-----------------------------------|--------------------|-----------------|
| 1               | Security Screwdriver              | GH 100-115         | 1               |
| 2               | Red Seal 'O' Ring (Front)         | GH 100-080F        | 1               |
| 3               | Red Seal 'O' Ring (Rear)          | GH 100-080R        | 1               |
| 4               | Black Electrode 'O' Ring          | GH 100-074         | 1               |
| 5               | Cable Gland                       | GH 100-075         | 1               |
| 6               | Oscillating Board MK3             | GH 100-077         | 1               |
| 7               | Electrostatic Electrode (Std Oil) | GH 100-169         | 1               |
| 8               | Electrostatic Cascade MK3         | GH 100-076         | 1               |

On the oscillating board (GH 100-077) there are two free holes to solder wires to, P6 and P7 (they are marked on the board).

The cable from SAS has 2 cores, colours **RED** and **BLACK**, along with an outer sheath. The outer sheath can be removed.

Core colour **RED** goes to P6 and core colour **BLACK** goes to P7

## SPARE PARTS

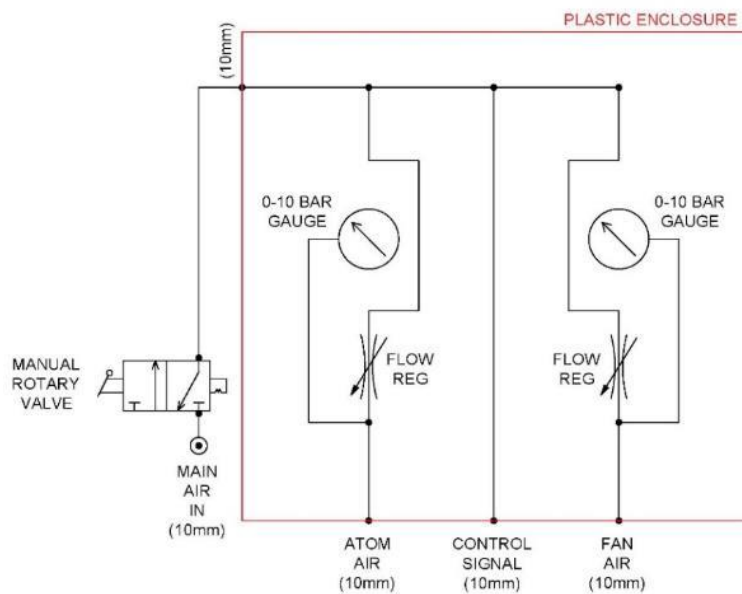
### PNEUMATIC CONTROL BOX Assembly Number : PB 200 133



**Fig 21**

| Position | Part Number | Description               |
|----------|-------------|---------------------------|
| 1        | PB 100-341  | Flow Regulators           |
| 2        | PB 100-343  | Pressure Gauges           |
| 3        | PB 100-342  | Control Air ON/OFF switch |

PNEUMATIC CONTROL BOX - 10mm  
PART No. 100-133-10



**Fig 22**

## SPARE PARTS

### SUPPORT BARS - OIL GENERATOR HEAD

Assembly Number : GH 200-322



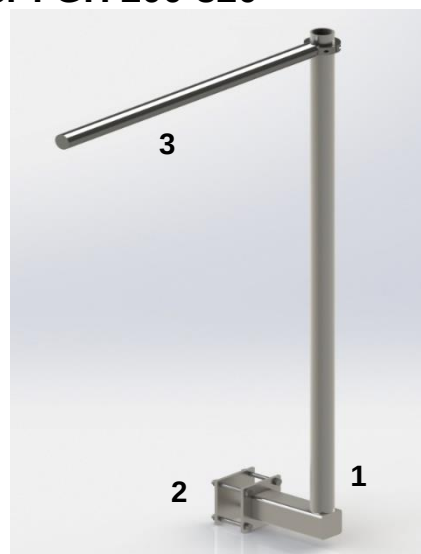
**Fig 23**

| Position | Description                           | Part Number |
|----------|---------------------------------------|-------------|
| 1        | 25mm to 30mm Cross Clamp              | GH 100-323  |
| 2        | 30mm Head Clamp & Bar Assy (25 x 200) | GH 100-322  |

*Oil Applicator & Generator head not included*

### FRAME MOUNTING BARS – GENERATOR HEAD

Assembly Number : GH 200-320



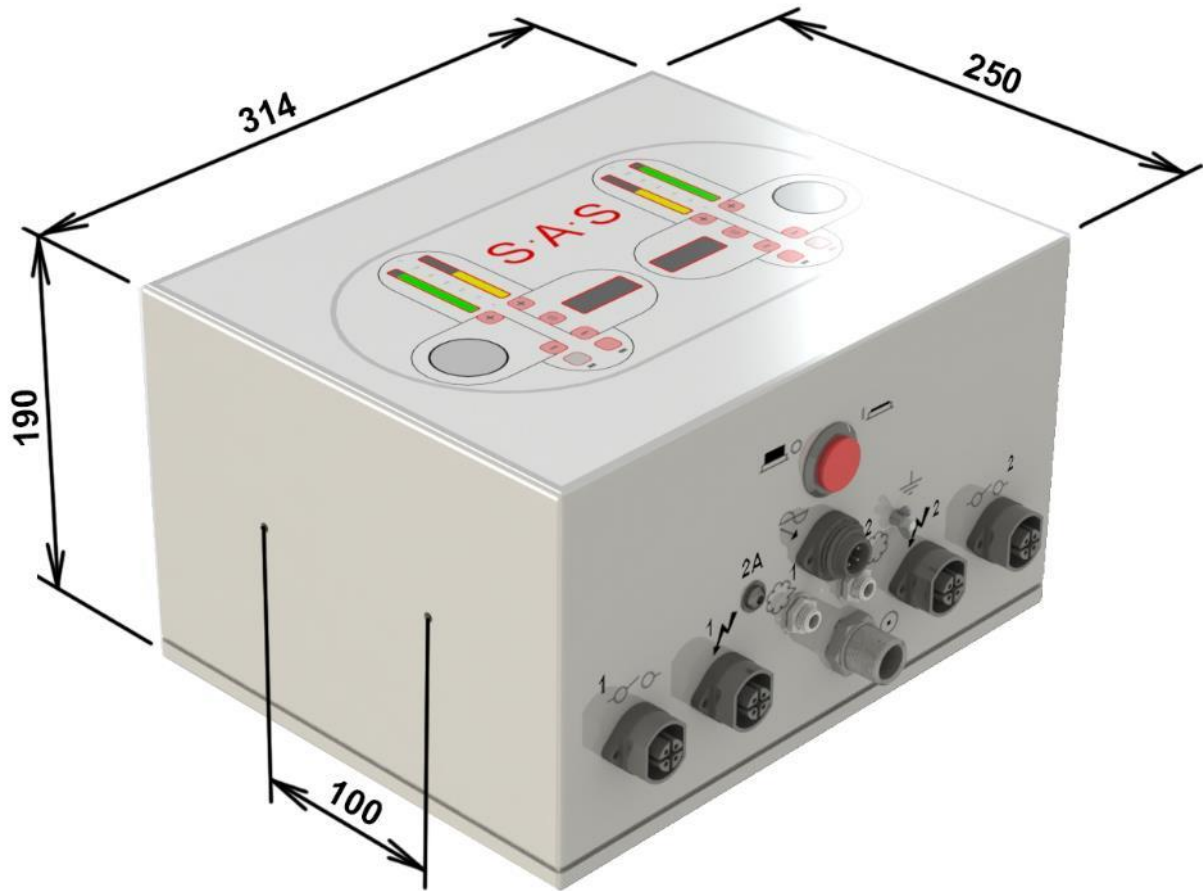
**Fig 24**

| Position | Description                         | Part Number |
|----------|-------------------------------------|-------------|
| 1        | Main Upright Support bar            | GH 100-320  |
| 2        | Back Plate                          | GH 100-148  |
| 3        | Horizontal Cross bar – 30mm x 600mm | GH 100-321  |

## DIMENSIONS

### ELECTROSTATIC CONTROLLER

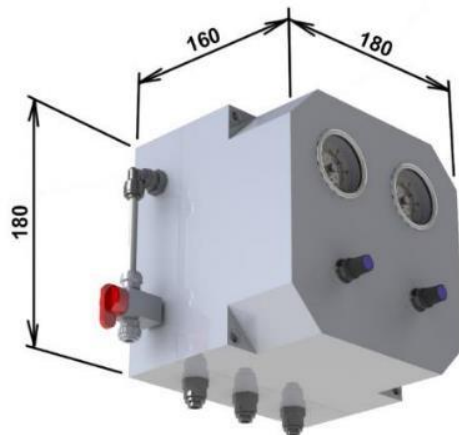
Assembly Number : CU 200-124



**Fig 25**

### PNEUMATIC SPRAY CONTROL BOX

Assembly Number : PB 200-133

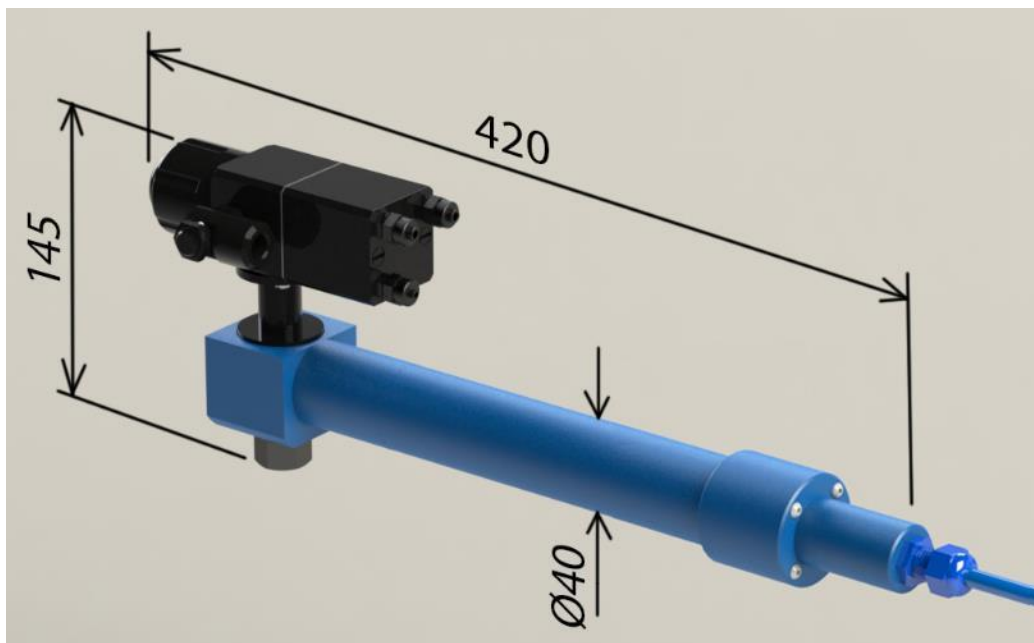


**Fig 26**

## DIMENSIONS

### OIL APPLICATOR & GENERATOR HEAD

Assembly Number : OH 200-161 & 132



**Fig 27**



## TECHNICAL SPECIFICATIONS

The SAS oil spray uses the principal of a conventional spray which enables it to obtain an excellent coating quality spraying with a flat/cone fan of adjustable width.

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

### ELECTROSTATIC CONTROL UNIT – OIL APPLICATION

|                                             |                                                                   |
|---------------------------------------------|-------------------------------------------------------------------|
| 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                      |
| Max No. of Electrostatic Outputs            | • Up to 2 Electrostatic Generator Heads                           |
| Supply Voltage to Generator Head            | • 3.5 – 13V d.c.                                                  |
| Supply Current to Generator Head            | • 400mA Max                                                       |
| Protection Category                         | • IP 65                                                           |
| Operating Temperature                       | • -10°C/+60°C                                                     |
| Control Box construction                    | • Stainless Steel Food Quality 304                                |
| Mains Cable construction                    | • Polyurethane - Black                                            |
| Compressed Air Input Supply                 | • Not used for Oil Application... See Pneumatic Spray Control Box |
| Compressed Air Input connection             |                                                                   |
| Compressed Air Input Consumption            |                                                                   |
| Max No. of Applicators                      |                                                                   |
| Atomising Air Output pressure to Atomiser   |                                                                   |
| Atomising Air Outlet connection to Atomiser |                                                                   |
| Regulated Air Output to Atomiser            |                                                                   |
| Total Weight                                | • 6.80kg                                                          |

### ELECTROSTATIC GENERATING HEAD

|                                |                                          |
|--------------------------------|------------------------------------------|
| Supply Voltage from Controller | • 3.5 – 13V dc                           |
| Supply Current from Controller | • 400mA Max                              |
| Output Voltage                 | • 20-80Kv negative charge                |
| Output Current                 | • 50uA Max                               |
| Protection Category            | • IP 65                                  |
| Operating Temperatures         | • -10°C/+80°C                            |
| Generator Head construction    | • Polypropylene/Acetal co Polymer - Blue |
| Generator Cable construction   | • Polyurethane – Blue                    |
| Total Weight                   | • 0.90kg                                 |

## TECHNICAL SPECIFICATIONS

### ELECTROSTATIC OIL APPLICATOR

|                                  |                                                                     |
|----------------------------------|---------------------------------------------------------------------|
| Atomisation Type                 | • Pneumatic – Round Swirl nozzle                                    |
| Spray Pattern size               | • 20cm dia @ 25cm target distance                                   |
| Operating Voltage                | • Negative, 20 kV to 80 Kv at gun tip                               |
| Number of Electrodes             | • 1                                                                 |
| Fluid Flow rate                  | • Max 1 Litre/min. (dependant on viscosity)                         |
| Fluid Pressure                   | • Max 10 bar / 145 psi                                              |
| Fluid Connection (P)             | • 8x6 Clear Poly hose (Food Grade)                                  |
| Fluid Temperature                | • Max 60°C                                                          |
| Air consumption                  | • 20Nm <sup>3</sup> /h (12 c.f.m.) @ 4 bar (58 psi)                 |
| Air Pressure – Atomising Air (A) | • Max 6 bar / 87 psi                                                |
| Connection – Fan Air (E)         | • 6x4 Polyurethane                                                  |
| Connection – Atomising Air (A)   | • 6x4 Polyurethane                                                  |
| Operating Temperature            | • 0°C to 40°C                                                       |
| Gun Construction                 | • Polyamide, Polyacétal & Food Grade Stainless steel (Wetted Parts) |
| Total Weight                     | • 460g (Gun Only)                                                   |

### PNEUMATIC SPRAY CONTROL BOX

|                                   |                                                 |
|-----------------------------------|-------------------------------------------------|
| Compressed Air Input Supply       | • 8 Bar (114psi) Max / 6 Bar (87 psi) Min       |
| Compressed Air Input connection   | • 10mm o/dia. push-in                           |
| Compressed Air Consumption        | • 20m <sup>3</sup> /hr (12 c.f.m.) per Atomiser |
| Max No. of Applicators            | • 1 Atomiser                                    |
| Regulated Air Outlets             | • Maximum pressure 4 bar (58psi) per Outlet     |
| Regulated Air Outlet connection   | • 10mm o/dia. push-in connection (2 Outlet)     |
| Unregulated Air Outlet connection | • 8mm o/dia. push-in connection (1 outlet)      |
| Total Weight                      | • 1.5Kg                                         |

## WARRANTY

Dear Customer,

Thank you for buying a SAS products and systems. Every care has been taken, from design to manufacture, to ensure that this product gives you complete satisfaction.

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.**

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