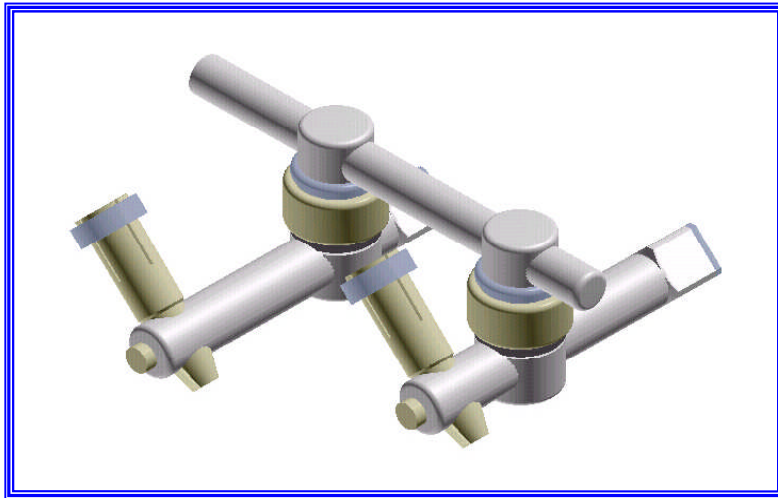


Spice Application Systems Ltd



INSTRUCTION MANUAL
**ELECTROSTATIC FOOD SPRAY UNIT
MODEL SAS DV**

PO Box1190
Oxford
OX4 4GH
England, UK

Tel:- 00 44 18 65 74 76 34

Fax:- 00 44 87 01 60 27 55

E-mail:- info@spiceapplications.com

Web:- www.spiceapplications.com

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Dear Customer,
Thank you for buying a new ELECTROSTATIC FOOD SPRAY UNIT - model SAS/ DRY/VIBRATOR every care has been taken, from design to manufacture, to ensure that this product gives you complete satisfaction.

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.

EC DECLARATION OF CONFORMITY FOR MACHINERY

The manufacturer : Spice Application Systems Ltd.,
PO Box 1190, Oxford, OX4 4GH, England, UK.
Tel: 00 44 11 79 10 23 93
Fax: 00 44 87 01 60 27 55

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

EC Machinery Directive 89/392/EEC Annex II, sub A
EC Low Voltage Directive 73/23/EEC
EC Directive of Electromagnetic Compatibility 89/336/EEC:
EN 50081-1
EN 50082-1
EC Equipment Using Flammable Materials 89/336/EEC
EN50 050:1986
EN50 053:Part 2:1989

All as amended, and with national implementing legislation.

Established in Oxford, on October 1st 1999

Peter King
Managing Director

Warning

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

The Electrostatic Generating head 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 over –riding the built in safety features.

Any unauthorized 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 SAS/DRY/VIBRATOR spray unit uses the principal of atomising the spice as it falls off the vibrator by spraying air and electrical charge onto the powder, it is 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

The pneumatic system to provide clean, dry, oil free food quality compressed air a minimum pressure of 4 bar / 58 psi

| | |
|----------------------------|---|
| Electrical features | Ionization.....Negative charge on the electrode. |
| Weight : | Total weight with BG (without cable or hose) : 1.25kg / 2.75 lb |
| Stainless Steel | Food Quality 316/304 |
| Plastics | Polypropylene Co Polymer-Nat Acetal Co Polymer-White |
| Cable | Polyurethane-Black (Special design for SAS) |
| Cable Gland | Polymide-Light Grey |

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 Miniature Circuit Breakers – Live & Neutral |
| 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 54 (IP 67 when fitted into an SAS designed cabinet) |
| Operating Temperature | - -10°C/+60°C |

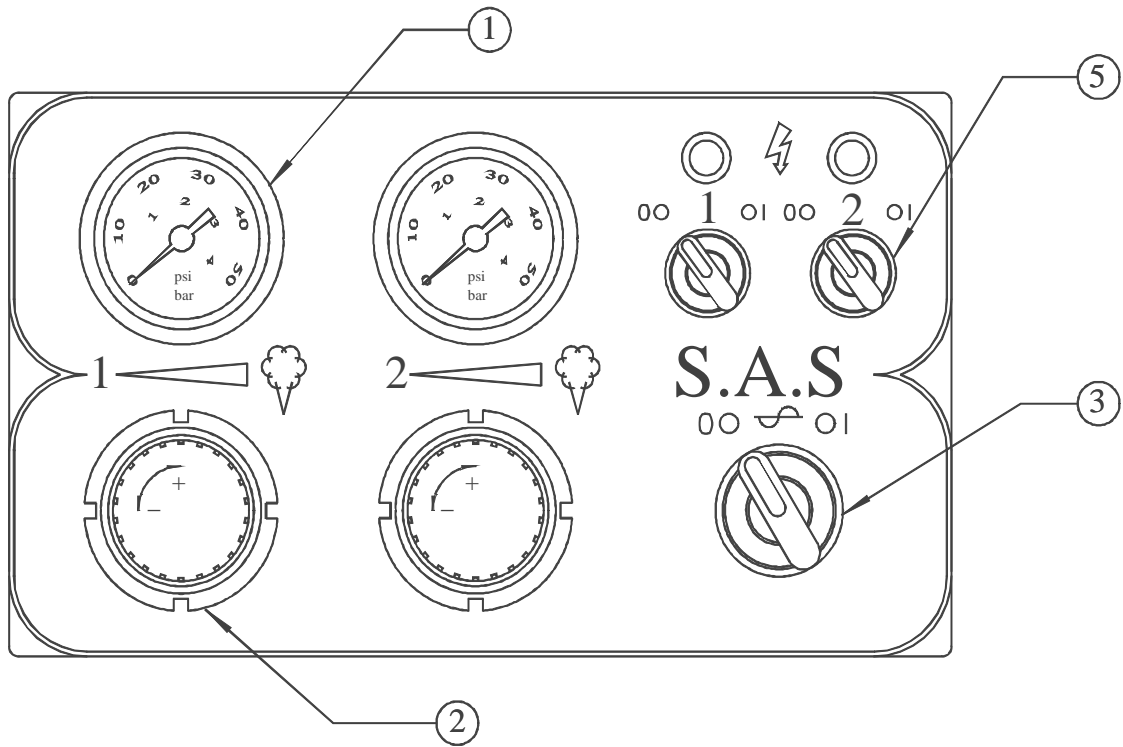
ELECTROSTATIC GENERATING HEAD

| | |
|------------------------|----------------|
| Supply Voltage | - 3.5 – 13V dc |
| Supply Current | - 400mA Max |
| Output Voltage | - 20-85kV |
| Output Current | - 50uA Max |
| Protection Category | - 1P 67 |
| Operating Temperatures | - -10°C/+60°C |

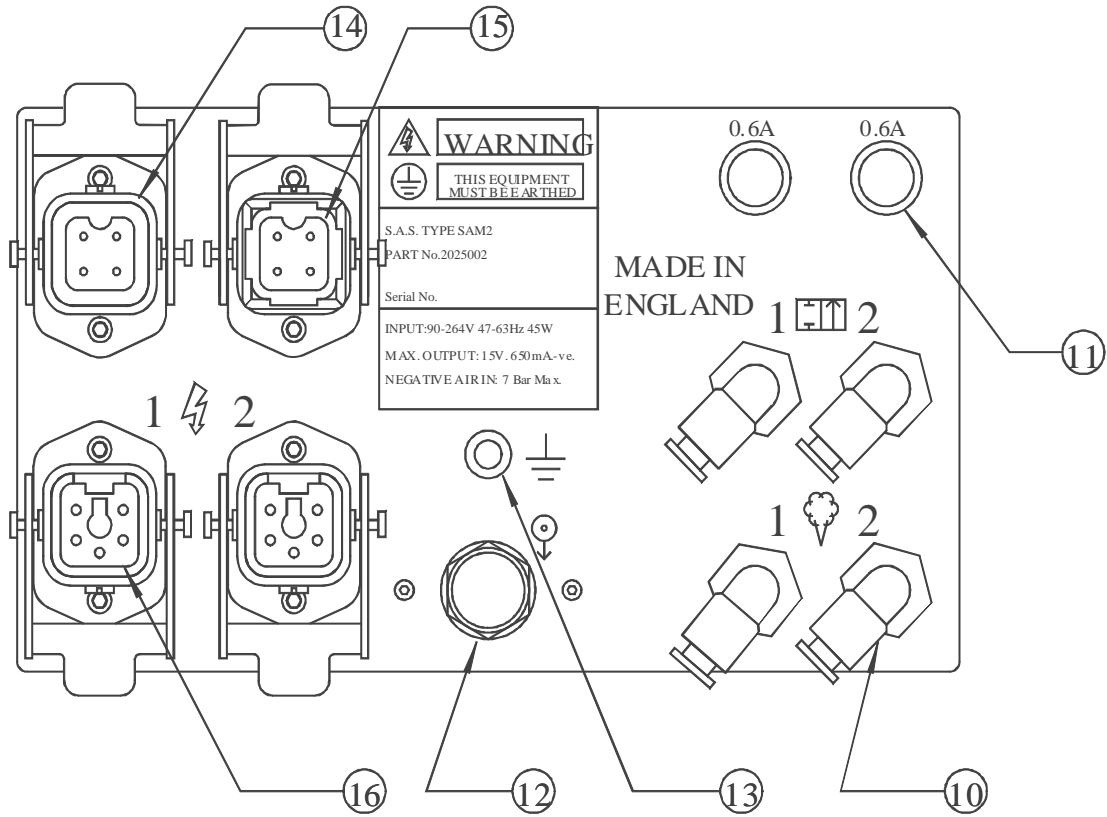
PNEUMATIC – CONTROL UNIT

| | |
|----------------------------|---|
| Compressed Air Supply | - 8 Bar (114psi) Max / 5 Bar (75 psi) Min |
| Compressed Air Consumption | - 10m ³ /hr (6 c.f.m) per Applicator |
| Max Water Vapour Content | - 1.3g/m ³ |
| Max Oil Vapour Content | - 0.1 p.p.m. |
| Regulated Air Output | - 0-4 Bar |

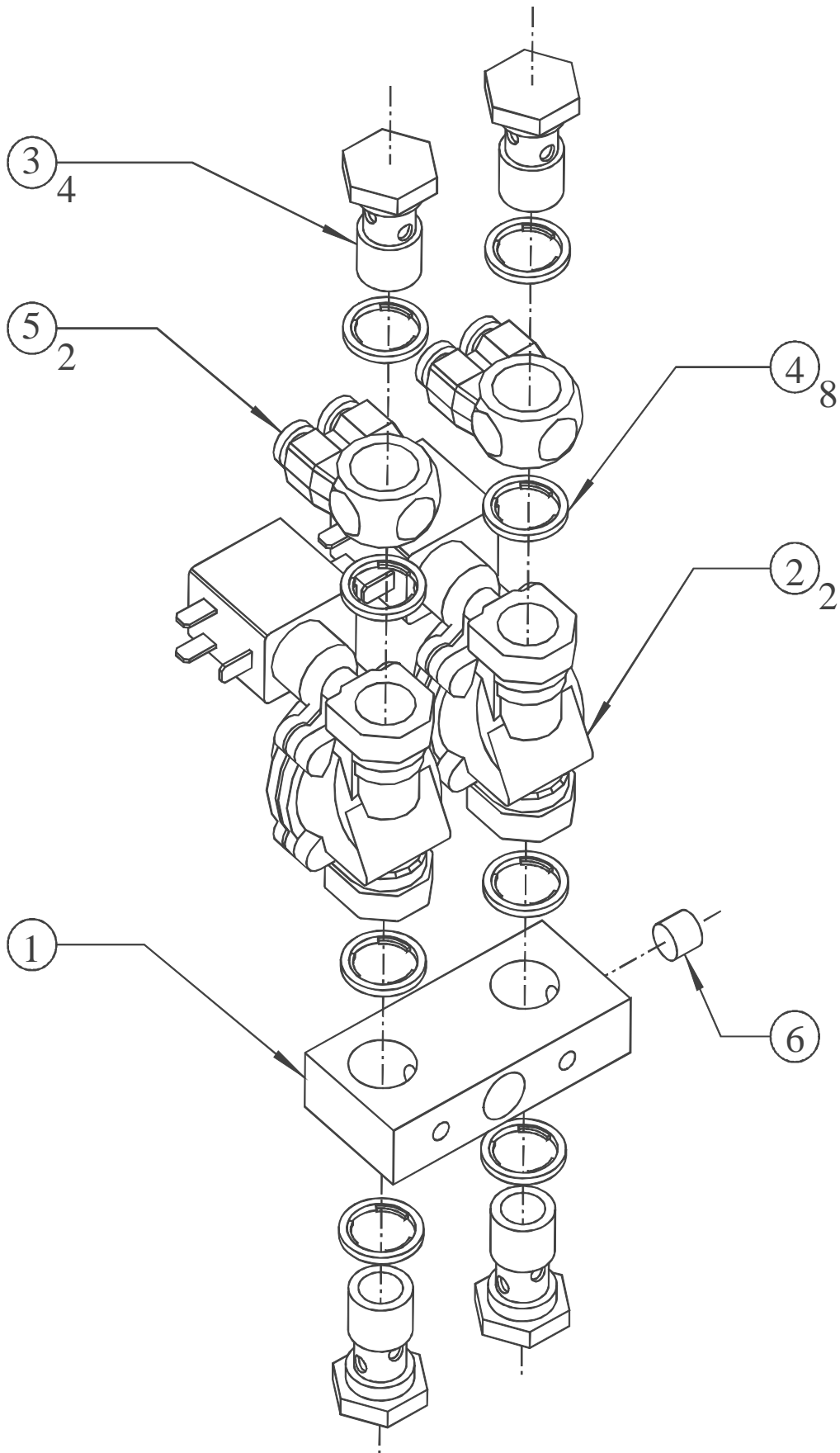
CONTROL UNIT FRONT PANEL



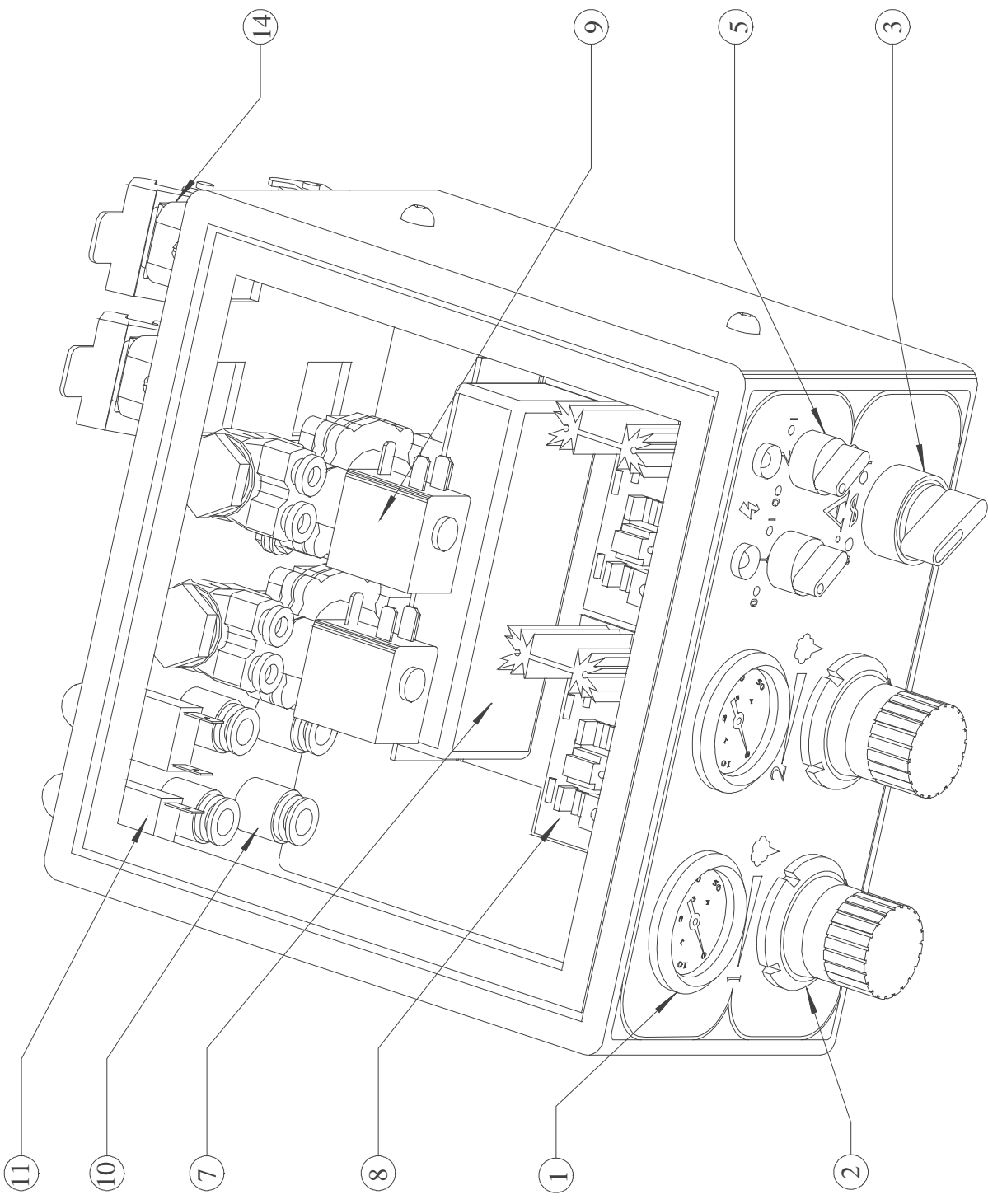
CONTROL UNIT REAR PANEL



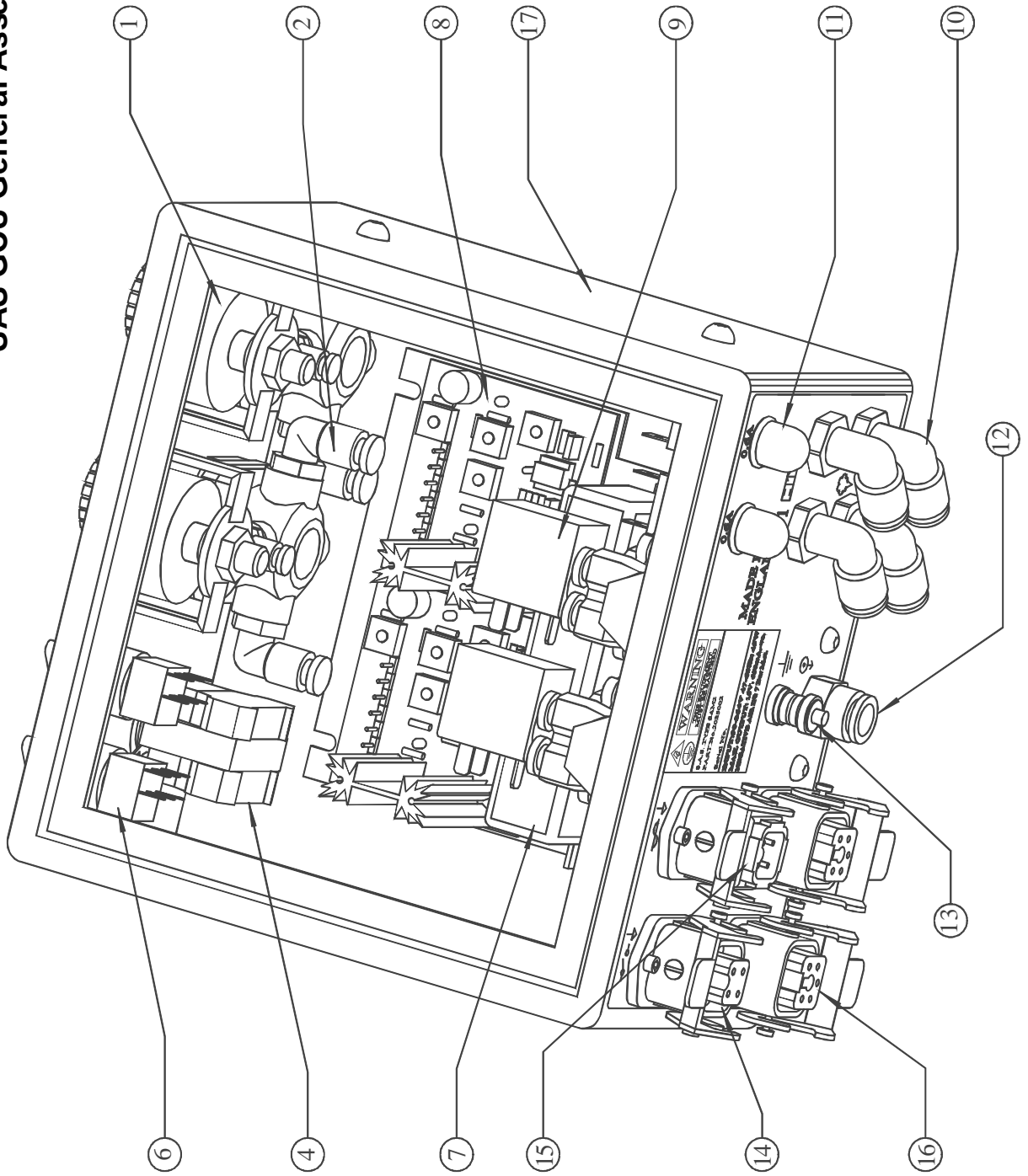
SAS Manifold Inlet Assembly



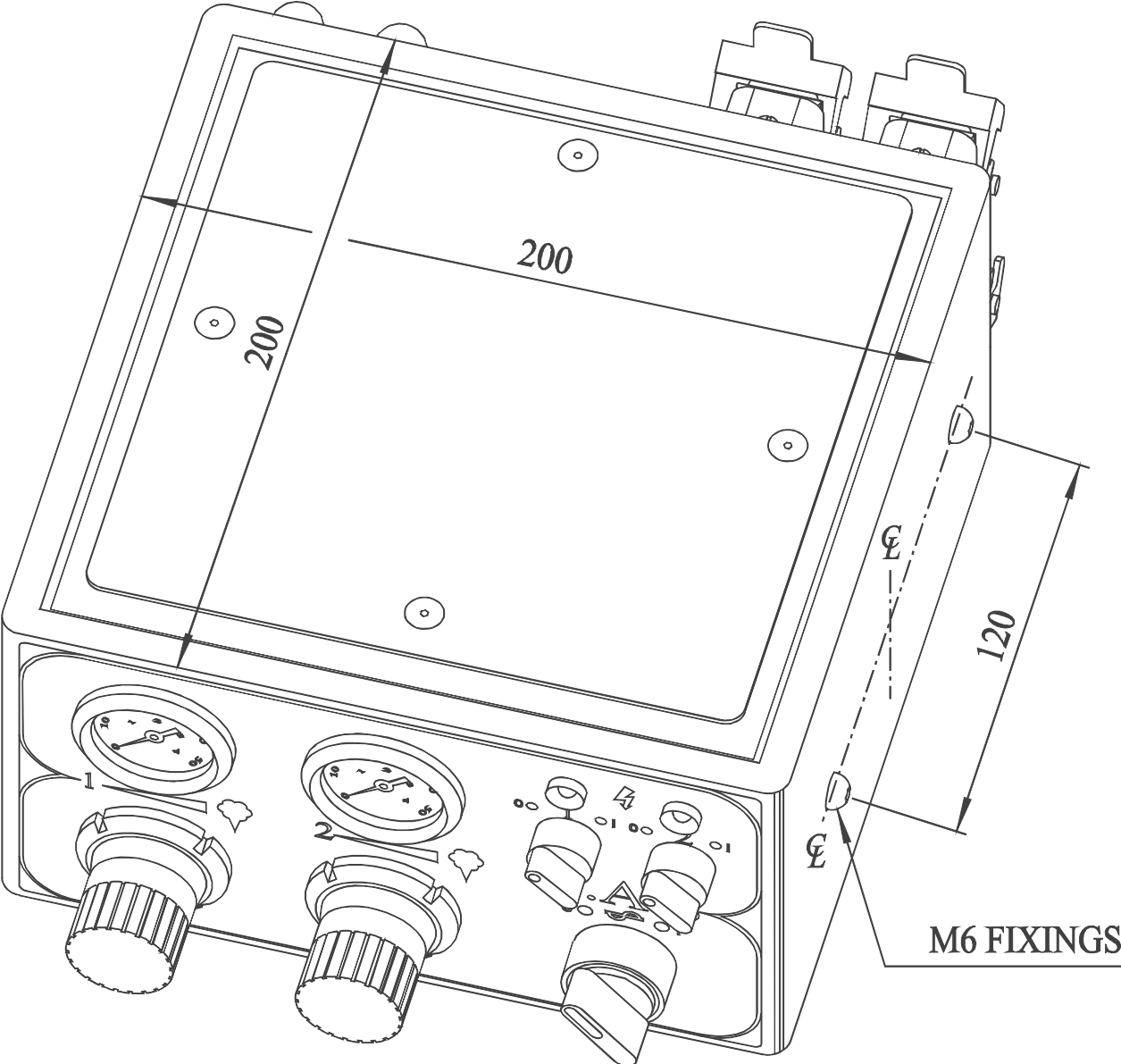
SAS GCU General Assembly - Front



SAS GCU General Assembly - Back



SAS GCU Overall Dimensions



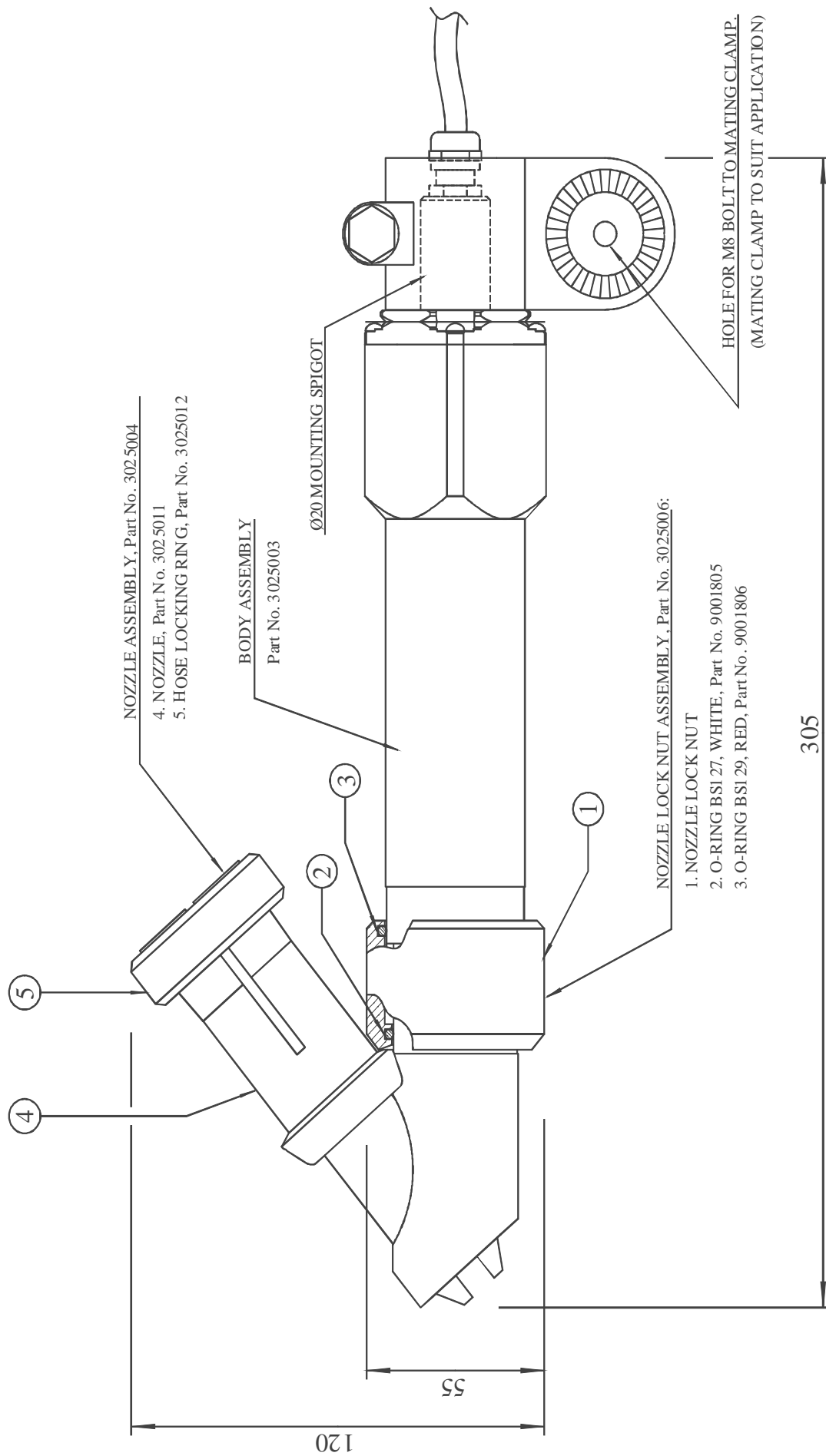
**Spice Application Systems
Gun Control Unit General Assembly
Part No. 2025030**

| Item | Part No. | Description | Qty. |
|------|----------|---------------------------------------|-------|
| 1 | 2020023 | 0-4 Pressure Gauge with Black Bezel | 2 |
| 2 | 2025021 | Pressure Regulator 4 Bar Assembly | 2 |
| 3 | 9001797 | Switch Front 22.5mm | 1 |
| 4 | 9001798 | Contact Assembly 22.5mm | 1 |
| 5 | 9001799 | Switch Front 16mm | 2 |
| 6 | 9001800 | Contact Assembly 16mm | 2 |
| 7 | 9001768 | Power Supply Unit SSL 40-7624 | 1 |
| 8 | 2025005 | PCB Assembly | 2 |
| 9 | 2025004 | Inlet Manifold Assembly | 2 |
| 10 | 9001758 | Swivel Elbow, 8mm | 4 |
| 11 | 9000016 | Circuit Breaker, 0.6A | 2 |
| 12 | 9001508 | Straight, 1/4 BSPMT - 10mm OD Tube PI | 1 |
| 13 | 9000021 | Terminal, Earth Post | 1 |
| 14 | 9000012 | Connector Socket Insert 3 PIN + E | 1 (2) |
| 15 | 9000011 | Connector Plug Insert, 3 PIN + E | 1 |
| 16 | 9000013 | Connector Socket Insert 4 PIN + E | 2 |
| 17 | 2025010 | SAS Case | 1 |
| 18 | 2025012 | SAS Lid * | 1 |

* Not shown on this illustration

**Spice Application Systems
Inlet Manifold Assembly
Part No. 2025004**

| Item | Part No. | Description | Qty. |
|------|----------|--------------------------------------|------|
| 1 | 2025015 | SAS Inlet Manifold | 1 |
| 2 | 9000038 | Valve, Solenoid, 2-2 3/8 BSP, 24V.DC | 2 |
| 3 | 9001531 | Banjo Bolt 3/8" BSP Single | 4 |
| 4 | 9000042 | Washer, Sealing, 3/8 BSP, Nylon | 8 |
| 5 | 9001794 | Banjo Body 8mm | 2 |
| 6 | 9000034 | Blank, 1/8 BSPMT, Hex SKT | 1 |



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. e.g.. 2 –Wire extension leads as used for some domestic equipment **MUST NOT BE USED.**

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

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

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.

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 12 Vdc into 85 kV negative charge, the material being applied is drawn to the positively grounded product.

INSTALLATION

1. For full and perfect performance the drum will require at least 6 horizontal flights and diameter of at least 0.750 mtr.
2. 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.
3. The vibratory system is delivered with a support bar and fixings to allow adjustment for the correct positioning of the vibratory tray (See attached photograph, page24)
4. The electrode needle on the spray head must always be pointing away from the vibratory tray
5. 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 67. Contact Spice Application Systems Ltd. for this fitting
6. The Spray Head is delivered already attached to the vibratory unit.
7. 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.
8. The appropriate distance between the spray head air knife and the product to be coated to be of about 20 - 45 cm / 8" - 18" (minimum distance is 15 cm / 6").
9. The control unit must be located outside the flavouring drum.
- 10. All metal parts, pumps, containers, conveyors (feeding in and out of the drum) and any other conductive article within 2mtrs/ 6ft - must be grounded.**
11. Keep the spraying area clean. Remove all unnecessary metal components.
12. After fixing the the electrostatic generating head in place inside the drum. Fix the black cable with plug attached to the back of the control attachment, to electrical plug maked "1" and lock into place. (Locking mechanism already attached to control) If using a twin head system attach both black cables, first to "1" and the second to "2" . [see control drawings under page 7 Item 16]
13. After fixing the electrostatic generating head in place inside the drum. Fix the 8mm air line 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 control drawings under page 7 Item 10] The other end of the air lines attached to the air fittings on the air knife under the vibratory tray.

14. The two upper air fittings on the control are for blowing down the line for cleaning during spice change. The control is delivered with blank off plugs fitted. Remove a blank off plug and insert the 8mm air line (Push in firmly) which is attached to the blow down gun.
15. Plug into rear of control (Item.12) a 10mm air line from the main air supply.(The air always has to be clean and dry. Fit a filter if necessary)
16. Plug mains electric supply into back of control (Item 14) and lock into position. **When wiring up the mains supply the earth must be wired to the factory mains earthing system.**
17. Item 15 at the back of the control is for a remote trigger for tuning 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.
18. Wire the earthing cables from the drum to the earthing point at the rear of the control. Item 13.
19. The drum must be earthed in 2 places. With the earthing contacts rubbing against the wall of the drum. The out going and incoming vibratory conveyors to and from the drum must always be earthed.

ATOMIZATION

- 1 - The part to be coated must be connected to the ground continuously.
- 2 - Keep the air knife perfectly clean.
- 3 - Do not use the equipment if there is an air leak in the hoses.
- 4 - Be sure that the product does not come closer than 15 cm / 6" and no further than 45cm/18" from the spray head.
- 5 - Before plugging in the power supply unit, be certain the electrostatic generating unit's air knife nozzle is installed correctly. The flat jet has to be horizontal.

POWDER FLOW SYSTEM

- 1 - Position the vibratory tray under the screw feeder (using an addaptor if required), it must be aligned correctly to allow the powder to fall into the vibratory tray
- 2 - Position the vibratory unit at about a 45 angle to the product
- 3 - The vibratory system need not be moved for cleaning. The system is IP65
- 4 - The system must be set-up to freely transport the powder throughput from the screw feeder at the maximum line rate, i.e. Set the air pressure at the electrode air knife (1.0 - 1.5bar) as if the plant is at maximum production.

START UP

ELECTROSTATIC CIRCUIT

- 1 - Connect the SAS/Dry control to its power source
- 2 - Supply the SAS/Dry control with clean dry compressed air (P = 4 bar / 58 psi)
- 3 - Turn the power-supply ON/OFF switch to the ON position (Item 3)to ON position (Item 5)
- 4The 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
- 5Turn the vibrator control to ON position

QUALITY ADJUSTMENT

Adjust the spraying parameters ON THE FRONT OF THE CONTROL:

- Material flow rate (Pressure regulator Item 1) Adjust by turning clock wise for more air anti-clockwise for less air. Push in to lock, pull out to unlock (Item 2)
- Electrostatic effect (High voltage is on. Yellow light glowing).
- ON THE FRONT OF THE VIBRATOR CONTROL 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

The air hoses and the generating head must remain dry.

The electrostatic efficiency decreases quickly when spray head and hoses are dirty or damp, this will lead to poor quality finished product.

CLEANING METHOD

The ON/OFF switches on the power supply and to the spray head must be OFF before starting cleaning opération.

Wait for 10 seconds before entering the drum

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.

Synthetic resins used in the fabrication of the electrostatic spray head can react with certain cleaning agents. Check with SAS .

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

Dry the spray head carefully and thoroughly with air.

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 VIBRATOR)

Warning : Never switch ON the Electric power supply unit during the washing and cleaning operation.

Before switching ON the electrostatic effect :

- Install the air knife into the electrostatic generating head making sure it is set horizontal
 - Connect the flexible air tube to the air knife
 - 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 –
 - The air knife is correctly installed into the spray unit.
 - Re-connect the three pin plug and cable assembly to the power source.
 - Re-connect the ground wire to an earth connection.
 - Re-connect 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.

NEVER LEAVE ASSEMBLY AND SPRAY HEAD IMMERSSED IN CLEANING SOLUTION. ALWAYS STORE IN A DRY PLACE.

NEVER USE METAL TOOLS TO CLEAN THE SPRAY HEAD.

DAILY CARE

- 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 or knotted
- 4 - all earthing wires on the in/outgoing vibratory trays and the drum are connected correctly.

TROUBLE SHOOTING

Unit will not operate :

1. **Mains connector not fitted to control panel :**
 - Connect to the rear of control panel (page 7 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 7 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 powder delivery:

1. **Screw feeder Blocked:**
 - Empty screw feeder, remove screws and clean thoroughly
 - Re-assemble and re-fill hopper
2. **Insufficient air pressure to the air spray head:**
 - Increase air pressure at the control
1. **Pinched or restricted air lines:**
 - Check and replace if necessary
2. **No powder in the screw feeder:**
 - Fill the screw feeder hopper
3. **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:**
 - Re-set 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
 - Re-fill 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 the 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:***
 - Re-set the earth wiring and contacts
4. ***Powder very fine (Under 60 microns)***
 - Powder supplier to re-formulate the powder.
4. ***Air pressure too high:***
 - Turn down the pressure at the control

Operators are getting electric shocks:

1. ***Earthing not connected:***
 - Re-set 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

AIR KNIFE PARTS LIST

PART NO. 8259058 FLAT AIR SPRAY NOZZLE 110° WHITE (AIR JET)
PART NO. 8474 AIR SPRAY BODY BLACK
PART NO. 8475 AIR SPRAY CAP BLACK
PART NO. PM450812E FEMALE ADAPTOR BLACK (JG)

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.

Turn on the electrostatic generating head.

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.

Always make sure you are holding onto an earthing point when doing this test, or you are wearing conductive shoes.

If no red light appears refer to the main manual under Fault Finding:

Remote Trigger Wiring Diagram

Remote
Volt Free
Contact

