

## Model ES1a

Single 150mm Laboratory Electrospinning Platform.



# Operation and Maintenance Manual

# Specifications

## **Description:**

The ES1a is designed to be used by competent operators in a laboratory environment, using an aqueous solution. Other solutions may be spun but the materials of the header tank, hose and spinning tip may need to be changed.

The ES1a is a two-part bench top machine with a solid, easy to clean base. The constant head system is adjustable and has both coarse and fine adjustment. The moveable Spinning head can be set from zero to 150mm from the fixed target plane; this can be adjusted during operation. The power to the spinning head is adjustable from zero to +33,000 VDC from the separate control box.

## **Materials:**

Base and control box are constructed from stainless steel.

Insulating materials are acetal.

Target plane 300mm x 350mm x 10mm polyethylene (PE)

Electrical connection fittings are brass.

Header tank is glass.

Hose is Silicone rubber.

Spinning tip is high density polypropylene.

## **Power Supply:**

Single phase 100 to 240 VAC, 1 amp maximum.

Power supply socket is a DIN standard fitting; most computer cords will fit this.

## **Contact:**

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# Safety

**High voltage power can present a serious risk of personal injury if not used in accordance with these safety instructions. All users of this equipment must have read and understood the contents of this manual before operation is begun.**

The ES1a complies with the relevant New Zealand standards and has been constructed to the electrical part of the BS EN 50 059: 1991 specification for hand-held spraying equipment for non-flammable material for painting and finishing. Although the output voltage can be as high as 33,000 Volts, the maximum output current cannot exceed 0.3mA. No conducting parts of the machine that are not earthed can be touched by the operator during normal operation, provided that these instructions are correctly followed.

## **Caution:**

Static charges may be present on insulated components, even when the equipment is turned off. Users **MUST ALWAYS** earth themselves by holding the metal frame of the ES1a before touching any other part of the equipment.

Electrospun fibres are charged during manufacture, this charge may be transferred to the depositing area. This charge is very low and provided the user is earthed, should be safe to handle.

After the equipment is turned off, the high voltage system will take about two seconds to discharge; do not touch the spinning bush during this time.

Do not use this equipment unless the spinning tip and the feed hose are in place.

Always ensure that there are no volatile gasses near the ES1a during operation as a static discharge could cause ignition.

# Initial Assembly

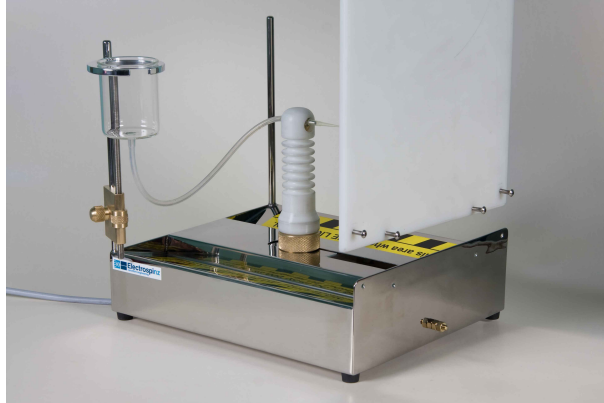
## ***Parts checklist:***

1. ES1a spinning platform
2. ES1a Control box
3. 300mm x 350mm Target plane with 4 machine screws.
4. Power cable. 1 off
5. Constant head system. 1 off
6. Hose 2 m
7. Glass header tank 2 off
8. Toolbox containing 1 x allen key set, 1 x 10mm spanner, 1 x 11mm spanner.



A. Unpack and check that the parts are all present.

B. Remove the four machine screws and mount the target plane to the end of the spinning platform, do not over tighten the screws.



C. Install the constant head system as shown.



D. Plug the spinning platform lead into the back of the control box.



E. Plug the power cable into the back of the control box.

F. Check that the earthed power outlet has a good earth by plugging in the power lead with the switch OFF and checking for Voltage to another earthed point. This check is very important and should be repeated each time the ES1a is used.

G. Turn on the power to the ES1a at the wall, ensure that the HV Adj. Knob is turned to Zero and turn on the ES1a, the blue light on top of the control box should light up.



H. Turn the HV Adj. knob slowly to full power and back, the meter should smoothly move from zero to 33KV and back to zero.

I. Turn off the ES1a, it is ready to use.

# Operation

1. Perform assembly tests F. to I. Inclusive before steps 3 & 4 are followed.

## Assembly Tests

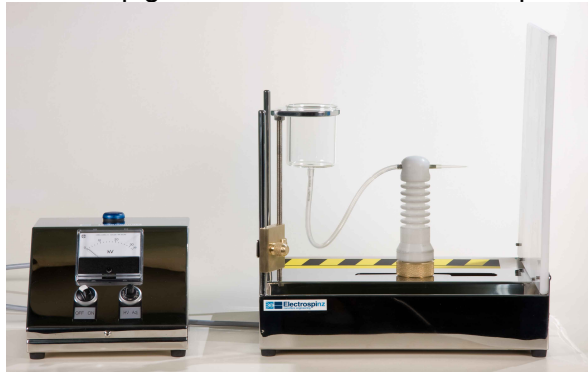
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H. Turn the HV Adj. knob slowly to full power and back, the meter should smoothly move from zero to 33KV and back to zero.

I. Turn off the ES1a, it is ready to use.

2. Place the glass header tank in the constant head system.
3. Connect the hose from the header tank to the spinning bush.
4. Insert the spinning tip over the spigot on the other side of the spinning bush.



5. Earth the target area; if this is not done then the fibre will be drawn to the nearest earthed thing. This is not necessarily the ES1a; it may be any structure within reach.
6. Pour the prepared polymer into the header tank.
7. Raise the header tank with the course adjustment to the priming position.



8. When the polymer is seen to be almost at the spinning tip lower the header tank to provide a head of about 20mm. This will need to be adjusted once spinning has begun.

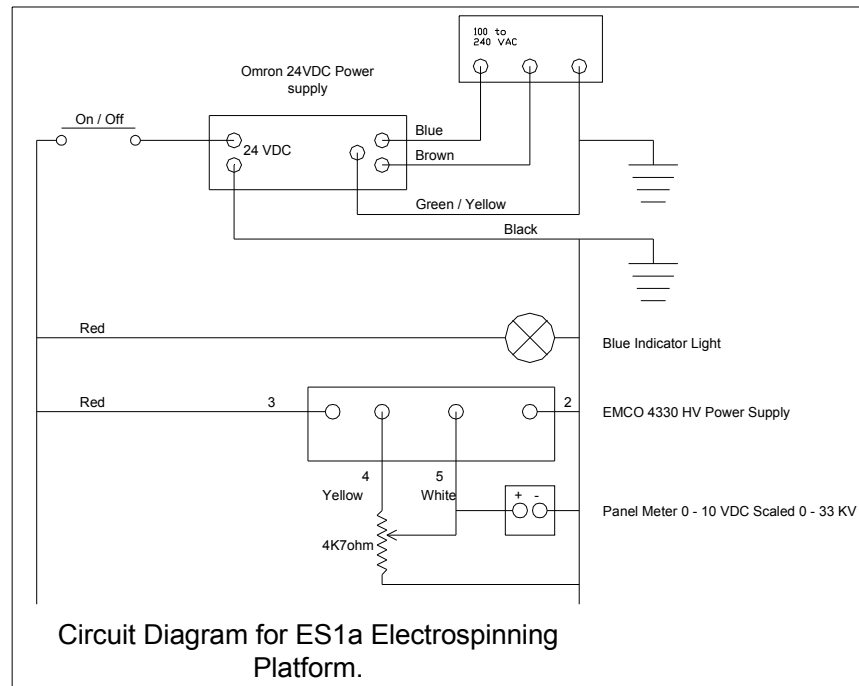


9. With the HV Adj. knob turned to zero, turn on the switch. While watching closely; raise the voltage until the Taylor cone appears this is normally visible with the naked eye. Normally only a very slight increase in voltage will initiate the spinning process.

10. Maintain the header tank to hold a small droplet of polymer at the spinning tip. Every now and then, a small droplet will fall from the spinning tip, this is quite normal. A piece of paper may be placed on the ES1a bed between the spinning tip and the target plane to assist with cleaning.

11. If spinning is continued too long then the build up of fibre on the target can be such as to insulate the target and fibre may be deposited in other areas.

## Circuit Diagram



Any servicing of the electrical system must be done by a qualified person in accordance with local requirements.

Wire numbers shown are for the Plug, socket, multi-core cable and HV power supply.