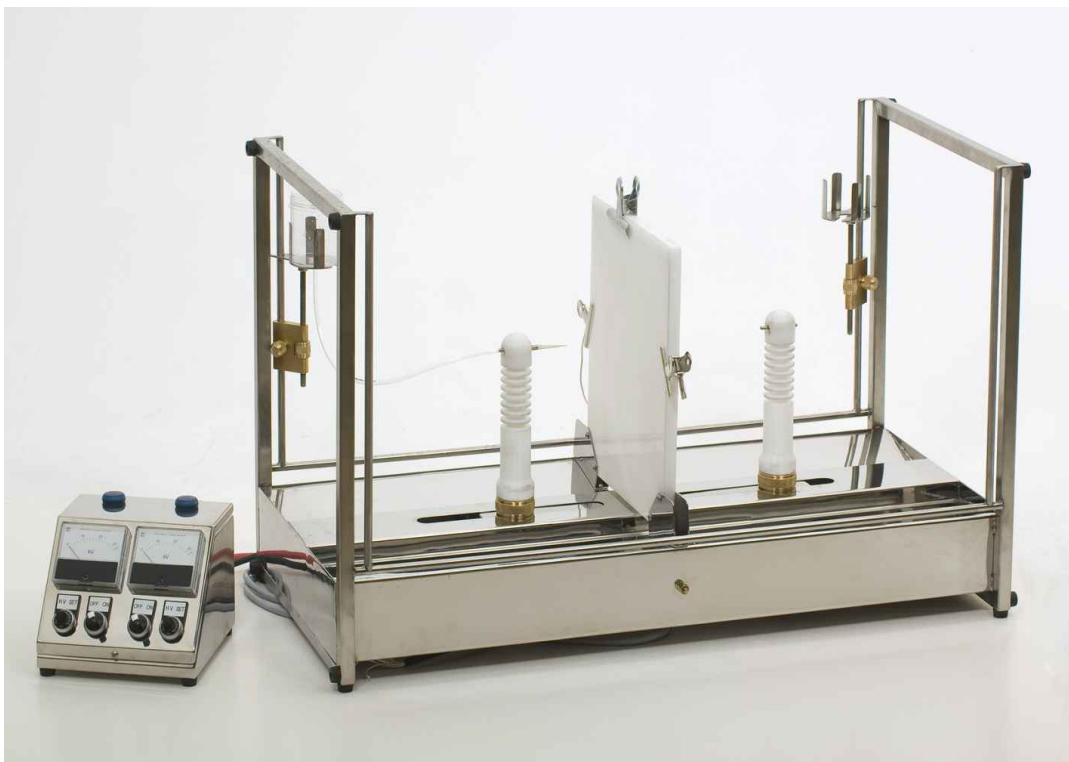


Model ES4

Double 200mm Laboratory Electrospinning Platform.



Operation and Maintenance Manual

Specifications

Description:

The ES4 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 hose and spinning tip may need to be changed.

The ES4 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 200mm from the fixed target plane; this can be adjusted during operation. The power to the spinning heads is adjustable from zero to + or - 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 Polyurethane.

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.

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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 ES4 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 ES4 before touching any other part of the equipment.

Electrospun fibres are charged during manufacture, some of this charge is transferred to the depositing area. This charge is very low and provided the user is earthed, is 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 ES4 during operation as a static discharge could cause ignition.

The high voltage power supplies fitted to the ES4 are rated at 10 Watts, do not overload them. They are designed to be used for electrospinning and are not intended for other uses.

Initial Assembly

Parts check list:

1. ES4 spinning platform and Control box



3. Earthing jumper leads 2 off
4. Power cable. 1 off
5. Constant head system. 2 off
6. Hose 2 m
7. Glass header tank 2 off
8. Toolbox containing 1 x allen key set, 1 x 10 / 11mm spanner.



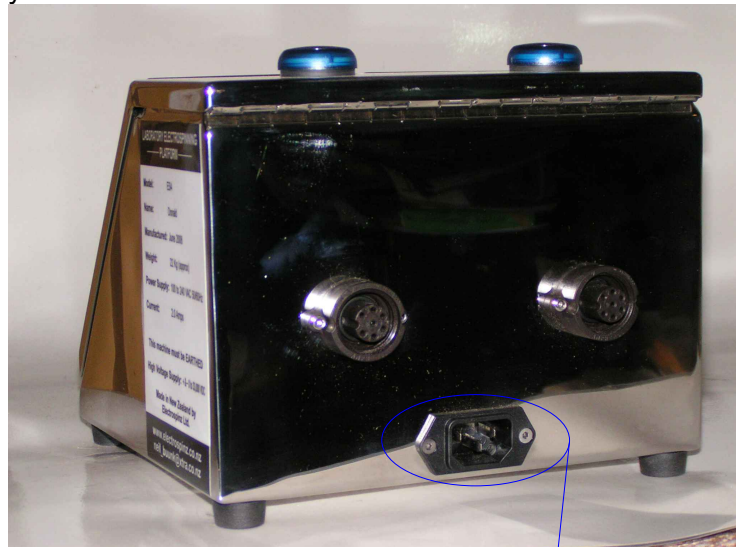
A. Unpack and check that the parts are all present.

B. If the target plane is shipped unmounted. Remove the four machine screws and mount the target plane to the Mounting brackets in the middle of the spinning platform, do not over tighten the screws.

C. Install the constant head system to one of the rods as shown .



D. Plug the spinning platform leads into the back of the control box, the one coded Black is the negative spinning head and the one coded Red is the positive spinning head. These may be connected either way to reflect the current orientation of the machine.



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 ES4 is used.

G. Turn on the power to the ES4 at the wall, ensure that the HV Adj. Knobs are turned to Zero and turn on one side of the ES4, the blue light for that side 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, repeat steps G and H for the other side.

I. Turn off the ES4, it is ready to use.

Operation

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

Assembly Tests

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 ES4 is used.

G. Turn on the power to the ES4 at the wall, ensure that the HV Adj. Knob is turned to Zero and turn on the ES4, 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 ES4, 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 end 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 ES4; 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.

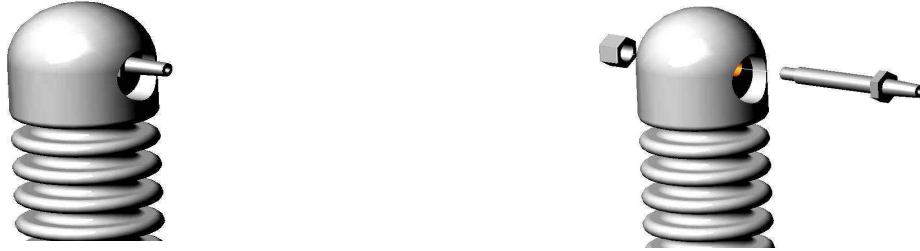
10. Maintain the header tank to hold a small droplet of polymer at the spinning tip. Every now and then, a small droplet will fall from the spinning tip, this is quite normal. A piece of paper may be placed on the ES4 bed between the spinning tip and the target plane to assist with cleaning.

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.

Maintenance

Cleaning

- A. Remove the header tank, hose and spinning tip. Move these to the cleaning area.
- B. Remove the spinning bush as shown, use the 10mm spanner if required.



Do not remove the brass spinning bush holder!
The spinning bush is made from stainless steel and should be thoroughly washed and dried before reassembly.
The spinning tip may be cleaned but is designed as a disposable item.

- C. Clean the base of the ES4 with a damp cloth or a cloth dampened with a little solvent. Be careful with solvents around the plastic components as these may be damaged by some solvents.
- D. Reassemble in the reverse order, be careful not to over tighten the nut on the spinning bush, finger tight is usually enough.

Servicing

The ES4 has been designed to be serviced without returning it to Electrospinz Limited.

The electrical system must be serviced only by qualified personal and must be maintained in compliance with the relevant local legislation. Replacement components are available world wide and should be obtained locally.

The mechanical components should be serviced by a competent person, any required special parts can be ordered from Electrospinz Limited.

