Elcometer 4340

Motorised Film Applicator

Operating Instructions

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This product meets the Electromagnetic Directive, Low Voltage Directive and the Machinery Directive.

The product is Class A, Group 1 ISM equipment according to CISPR 11

Group 1 ISM product: A product in which there is intentionally generated and/or used conductively coupled radio-frequency energy which is necessary for the internal functioning of the equipment itself.

Class A product are suitable for use in all establishments other than domestic and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

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All other trademarks acknowledged.

A copy of this Instruction Manual is available for download on our Website via www.elcometer.com.

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T hank you for purchasing this Elcometer Motorised Film Applicator. Welcome to Elcometer.

Elcometer are world leaders in the design, manufacture and supply of inspection equipment for coatings and concrete.Our products cover all aspects of coating inspection, from development through application to post application inspection.

The Elcometer Motorised Film Applicator, is a world beating product. With the purchase of this product you now have access to the worldwide service and support network of Elcometer. For more information visit our website at www.elcometer.com

1 ABOUT YOUR APPLICATOR

The Elcometer Motorised Film Applicator is a robust, reliable and extremely flexible machine. The machine is used to prepare a wide variety of product samples including paint, varnish, cosmetics, glue, etc., on various substrates such as contrast charts, sheet steel, plastic foils and glass.

The Motorised Film Applicator is designed for use with spiral bar coaters and film applicators (depending upon attachments specified at time of ordering).

The substrate is held securely in place on the table of the machine by clamp or vacuum[a] and the machine spreads the product in a consistent and reproducible film across the surface.

1.1 These instructions

These instructions describe the operation of the Elcometer Motorised Film Applicators:

Model No.	Vacuum table type	Table heating
Elcometer 4340/10-	non-vacuum	none
Elcometer 4340/11-	non-vacuum	external water bath[b]
Elcometer 4340/12-	non-vacuum	internal electric element
Elcometer 4340/100	perforated	none
Elcometer 4340/101	single channel	none
Elcometer 4340/102	double channel	none
Elcometer 4340/110	perforated	external water bath[b]

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a. Substrate securing method depends upon model.
b. Supplied ready to be fitted with a temperature bath. Temperature bath not included.

Elcometer 4340/111	single channel	external water bath[b]
Elcometer 4340/112	double channel	external water bath[b]
Elcometer 4340/120	perforated	internal electric element
Elcometer 4340/121	single channel	internal electric element
Elcometer 4340/122	double channel	internal electric element
Elcometer 4340/130	perforated/high speed	none

1.2 Standards

The Elcometer Motorised Film Applicator can be used in accordance with the following standard, ASTM D 823-C.

1.3 What the box contains

- Elcometer Motorised Film Applicator
- Substrate securing clip on table
- Bubble spirit level
- Operating instructions

Your Motorised Film Applicator may be supplied with additional attachments, depending upon which options were specified at the time of ordering:

- Film applicator attachment (with weight and hexagonal wrench)
- Spiral bar coater attachment (with weight x 2, hexagonal wrench, rubber mat x 2, and zero bar)
- Film applicator and spiral bar coater attachment (with weight x 3, hexagonal wrench, rubber mat x 2 and zero bar)

The Elcometer Motorised Film Applicator is packed in a cardboard and foam package. Please ensure that this packaging is disposed of in an environmentally sensitive manner. Consult your local Environmental Authority for further guidance.

To maximise the benefits of your new Elcometer Motorised Film Applicator please take some time to read these Operating Instructions. Do not hesitate to contact Elcometer or your Elcometer supplier if you have any questions.

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2 GETTING STARTED

This section of the instructions is intended for first-time users of the Motorised Film Applicator. It contains information on the parts and controls of your Applicator and advice on safe use of the equipment. When you have finished reading this section you will be ready to start using the Applicator.

2.1 The parts of your applicator
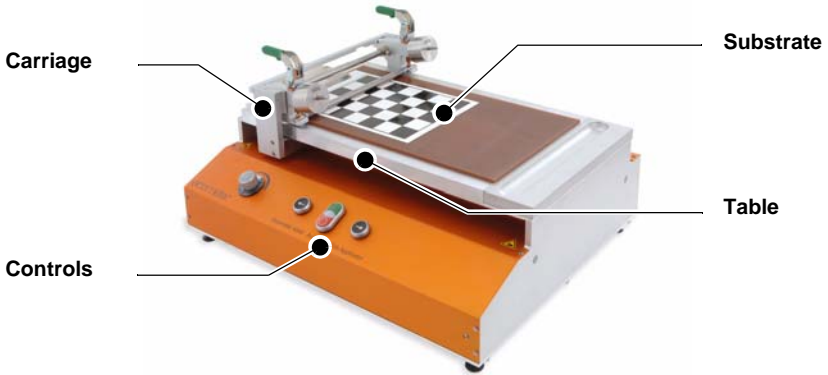
Figure 1. Parts of the Applicator
(this model fitted with spiral bar coater attachment)

2.2 Power input

The power input socket at the rear of the Applicator (Figure 2) is protected by two fuses - see "Technical specification" on page 19 for fuse rating.

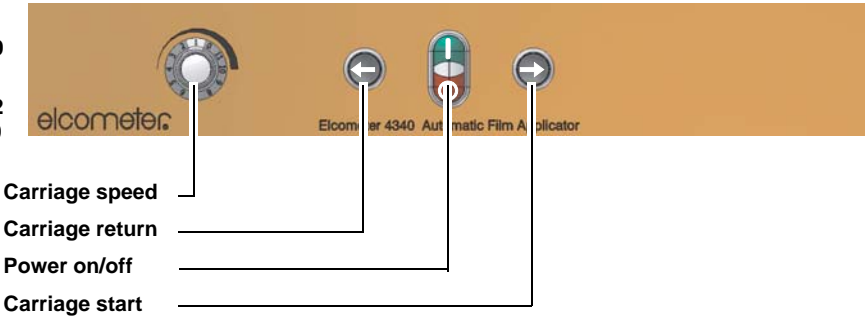**Figure 2. Power input socket, main on/off switch and fuse holder**

2.3 The control panel

The Applicator is operated using the controls mounted on the front panel of the machine. The controls fitted to your Applicator depend upon model number:

Model
Number

M10-
M100
M101
M102
M130

Carriage speed
Carriage return
Power on/off
Carriage start

M11-
M110
M111
M112

Temperature display
Hot surface warning lamp

M12-
M120
M121
M122

Temperature control/display
Electrically heated table on/off
Hot surface warning lamp

Figure 3. Control panels - all models

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2.3.1 Power on/off

To switch on the Applicator, ensure the main power on/off switch at the rear of the Applicator is in the 'on' position and then press the green button on the control panel. The indicator light in the centre of the button will illuminate.

To switch the Applicator off, press the red button on the control panel.

2.3.2 Carriage start and return

To start the carriage, press carriage start ⇒. The carriage will stop when it reaches the stop position.

To return the carriage to the start, press carriage return ⇐. The carriage will stop when it reaches the start position.

To stop the carriage movement at any time, press the red button on the control panel.

The start and stop positions can be adjusted - see "Setting the carriage start and stop positions" on page 8.

2.3.3 Setting the carriage speed

Carriage speed is adjustable; there are 11 preset speeds which are selected by rotating the carriage speed selector knob.

Carriage speed selector position	High Speed Carriage speed (mm per second)	Standard Carriage Speed (mm per second)
1	10	5
2	20	10
3	30	20
4	40	30
5	50	40
6	60	50
7	70	60
8	80	70
9	100	80
10	125	90
11	150	100

Note: Do not adjust the carriage speed while the carriage is moving.

2.4 Product overflow tray

(These instructions apply only to models fitted with a vacuum table)

The product overflow tray acts as a small reservoir to catch waste product which is pushed off the end of the table by the applicator. The tray can be removed to allow waste product to be cleaned off.

Figure 4. Product overflow tray

2.5 Caution

The Elcometer Motorised Film Applicator has been manufactured with your safety in mind. However, improper use can result in damage to the Applicator.

Please observe the precautions discussed in these operating instructions.

⚠ To reduce the risk of electric shock do not open the housing of the Applicator. There are no user-serviceable parts inside.

To reduce the risk of fire or electric shock, do not expose the Applicator to rain or excess moisture.

The mains plug on your Applicator may be fitted with a fuse. When replacing this fuse, ensure a fuse of the correct rating is used.

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2.6 Setting the carriage start and stop positions

Set the start and stop positions of the carriage to adjust the distance the carriage travels during operation.

To adjust start position

1. Switch machine on.
2. Press carriage start ⟹. The carriage will stop automatically when it reaches the stop position.
3. Unscrew knob (2), (Figure 5).
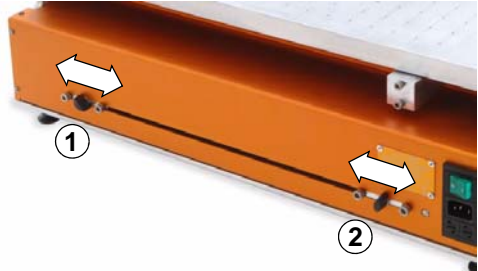4. Slide knurled knob to new position and tighten.

Figure 5. Rear of machine showing carriage start and stop adjustments

To adjust stop position

1. Switch machine on.
2. Press carriage return ⟸. The carriage will stop automatically when it reaches the start position.
3. Unscrew knob (1), (Figure 5).
4. Slide knurled knob to new position and tighten.

2.7 Fitting attachments to the carriage

Any additional attachments which may have been ordered with your Motorised Film Applicator are supplied loose and must be fitted to the carriage before use.

Three attachments are available: Film Applicator, Spiral Bar Coater and Combined Film Applicator/Spiral Bar Coater - See "Accessories" on page 20.

All the attachments are fitted to the carriage in an identical manner using the four screws shown (A).

To fit an attachment:

• Using the hexagonal wrench supplied with the attachment, loosen and remove the four screws.

• Place the attachment onto the carriage, align the mounting holes, refit the four screws and then tighten.

The illustration shows the Spiral Bar Coater attachment fitted to the carriage and secured by the screws (A). The Film Applicator is fitted to the carriage using the same procedure.

Note: The table fitted to your Motorised Film Applicator may be different to the table shown in the images above, but the attachments are fitted to the carriage in the same way.

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3 MOUNTING THE SUBSTRATE

To ensure an even application of the product film, the substrate must be mounted carefully on the table.

3.1 Mounting using the spring clamp

1. There are two mounting positions for the clamp. Screw the clamp onto the table in the position which suits the dimensions of the substrate (Figure 6).

2. Clean the surface of the table and the underside of the substrate[c].

3. Position the substrate on the table and clamp in place; A3 size substrate occupies virtually all of the table, A4 size substrate should be positioned on the right side of the table as shown (Figure 6).
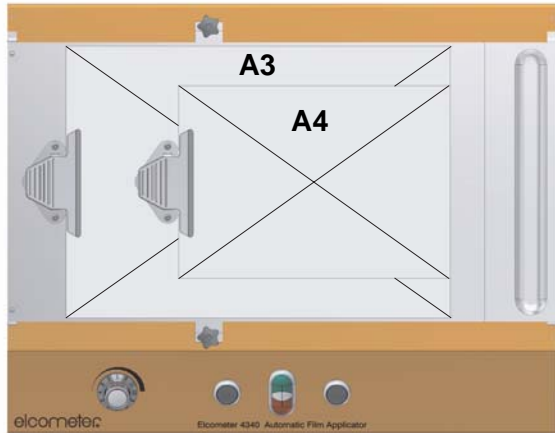

Figure 6. Clamp and substrate positioning

3.2 Mounting using vacuum

These instructions apply to models fitted with a perforated vacuum table. A channelled vacuum table only works with A3-size substrates.

1. Clean the surface of the table and the underside of the substrate.

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c. When using a spiral bar coater to apply the product film, place the soft rubber mat supplied with your applicator between the table and the substrate. Use of the rubber mat raises the substrate sufficiently to ensure it comes into contact with the spiral bar coater. Ensure both sides of the rubber mat are clean before use.

2. Position the substrate on the table; A3 size substrate occupies virtually all of the table, A4 size substrate should be positioned on the right side of the table as shown (Figure 7).
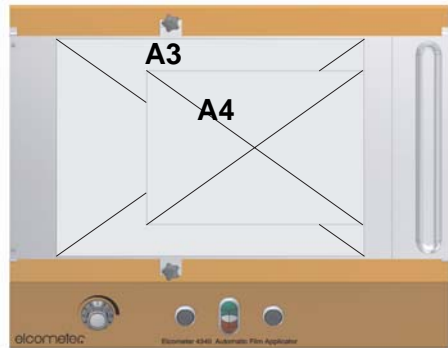

Figure 7. Substrate positioning on vacuum table

3. Attach the vacuum pump (see "Accessories" on page 20) using the hose to the connection on the left hand side of the machine (Figure 8).

4. If the specimen size is A3, turn the vacuum control marked 'A3 ON/OFF' to the 'on' position (in-line with the hose), as shown in Figure 8.

   If the specimen size is A4, turn the vacuum control marked 'A3 ON/OFF' to the 'off' position (at right angles to the hose).

Figure 8. Vacuum pump connection and control valve

5. Switch on the vacuum pump.

   The substrate will then be drawn onto the table and held firmly.

6. Mask off areas of the table not covered by the specimen. Use 'Scotch Tape' or a similar removable thin tape. This prevents product getting into the vacuum table or into the gap between the end of the table and the product overflow tray.

Note: The single channel and double channel vacuum tables are used for thin substrate materials such as paper (single channel) and foils (double channel)

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4 USING FILM APPLICATORS

4.1 Film applicators with a film applicator carriage

1. Mount substrate on table (see "Mounting the substrate" on page 10).
2. Place film applicator on substrate until it is touching the pushing bar.
3. Check to ensure the top surface of the pushing bar is below the top of the film applicator tool. If adjustment of the height of the pushing bar is required, rotate the knobs (Figure 9) an equal amount.
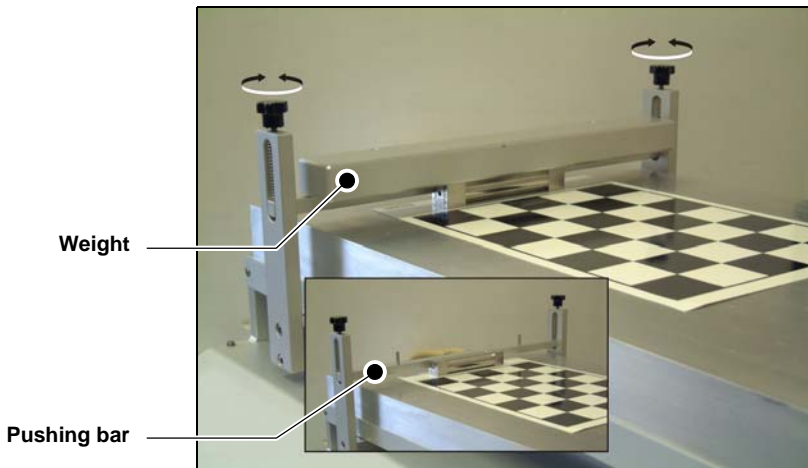

Figure 9. Standard carriage
Rotate knobs to adjust height of pushing bar

4. When using a light applicator such as the Baker, place the weight onto the two locating pegs. The weight rests on top of the film applicator and holds it firmly in contact with the substrate.

The film applicator is now mounted correctly and is ready for application of the product film.

4.2 Film applicators with a spiral bar coater carriage

1. Rotate carriage to raised position.

2. Fit applicator pushing bar into position and tighten knurled screws (Figure 10).

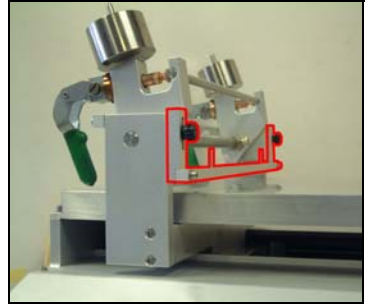3. Mount substrate on table (see "Mounting the substrate" on page 10).

Figure 10. Applicator pushing bar

4. Place applicator onto substrate in front of pushing bar (Figure 11).

5. Check that the top surface of the pushing bar is below the top surface of the applicator. Adjust the height of the pushing bar if necessary.
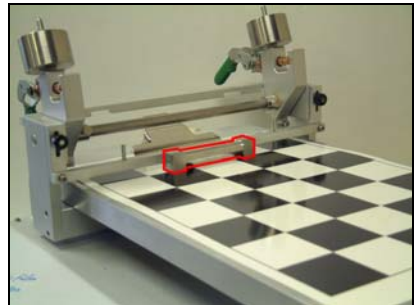

Figure 11. Applicator in position on substrate

6. When using a light applicator such as the Baker, place the weight onto the two locating pegs. The weight rests on top of the film applicator and holds it firmly in contact with the substrate (Figure 12).

Your film applicator is now mounted correctly and is ready for application of the product film.
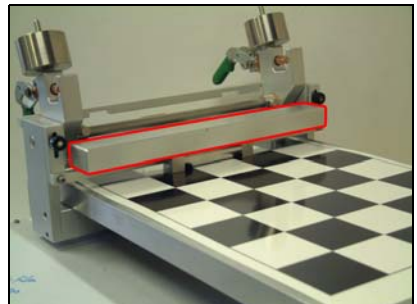

Figure 12. Weight pressing down on applicator

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5 USING SPIRAL BAR COATERS

Spiral bar coaters can only be used on Motorised Film Applicators fitted with a bar coater carriage. The rubber mat *must* be placed on the table when using a spiral bar coater.

1. Rotate carriage to raised position.
2. Remove weights.
3. Open clamps.
4. Fit spiral bar coater.
5. Close clamps.
6. Refit weights.
7. Clean the surface of the table and the rubber mat.
8. Position the rubber mat on the table and secure using the clamp.

Note: The rubber mat must be positioned accurately along the centre line of the table. Ensure that the carriage does not touch the rubber mat during its travel.

9. Rotate carriage to lower position.

   Check to ensure the spiral bar coater is touching the surface of the rubber mat. To adjust the height of the spiral bar coater, rotate the two screws (1) at the rear of the carriage (Figure 13).

10. Clean the underside of the substrate, position the substrate on the rubber mat and secure using the clamp.
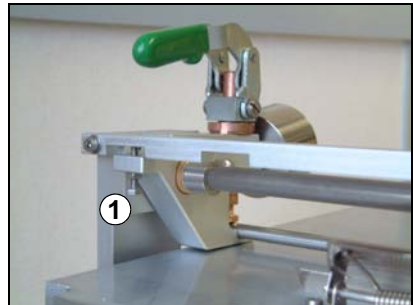

Figure 13. Bar height adjustment screw

Note: Never start the carriage without a substrate in place on the rubber mat. Friction between the rubber and the bar/ spiral bar coater will cause the carriage to become jammed.
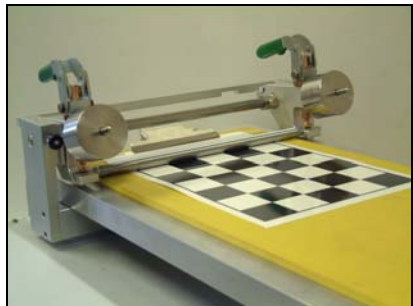

Figure 14. Bar coater carriage with spiral bar coater

6 PRODUCING A SPECIMEN

6.1 Before you start

- *Ensure the Applicator table is level.*
  Place the supplied bubble level on the table and adjust the feet of the Applicator until the table is level.

- *Select carriage speed.*
  See "Setting the carriage speed" on page 6.

- *Set carriage travel distance.*
  See "Setting the carriage start and stop positions" on page 8.

- *Mount the substrate.*
  See "Mounting using vacuum" on page 10.

- *Mount the applicator tool.*
  See "Using film applicators" on page 12 and "Using spiral bar coaters" on page 14.

6.2 Procedure

See Figure 15.

1. Apply the product

Pour the product onto the substrate in front of the applicator tool. Use a brush or similar tool to spread out the product across the width of the substrate.

2. Start the carriage

Press the green button to switch on the Applicator. Press carriage start $\Longrightarrow$. The carriage will travel across the substrate and will stop automatically when it reaches the stop position.

3. Clean the applicator tool

If using a spiral bar coater, rotate the carriage to its raised position and immediately wipe away any excess product to prevent product dripping on the substrate.

If using a film applicator, lift the film applicator from the substrate and wipe away any excess product to prevent product dripping on the substrate.

4. Return carriage

Press carriage return $\Longleftarrow$. The carriage will return to the start position. Press the red button to switch off the Applicator.
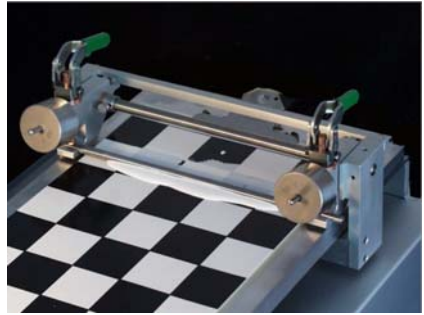
5. Remove substrate

Switch off the vacuum pump (vacuum table models only) and remove the substrate from the table.
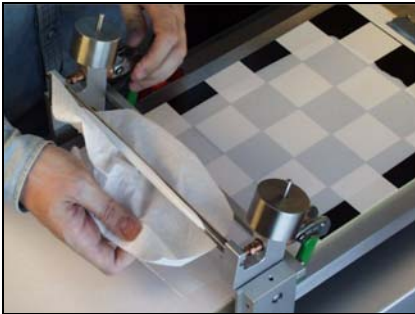
6.3 After application

1. If your Applicator is fitted with a product overflow tray, lift the tray off the machine, remove all product residue and refit.
2. Clean all splashes of product off the machine.
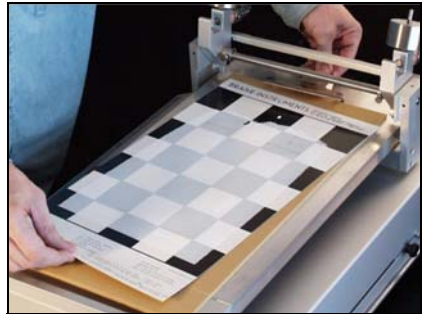3. Clean your applicator tool very thoroughly.

Apply the product

Start the carriage

Clean the applicator tool

Remove the substrate

Figure 15. Film application procedure (using spiral bar coater)

7 HEATED TABLES

Some Elcometer Motorised Film Applicator models are fitted with vacuum and non-vacuum heated tables. Heating is either by an external water bath or internal electrical elements.

⚠️ Take care when using a heated table. The temperature of the table can reach 200°C and can cause serious burns.

The outlet pipe of the vacuum pump must be located in a safe place to avoid burns caused by the waste hot air.

⚠️ The vacuum pump must be compatible with operation at temperatures up to 100°C or 200°C (depending upon model). It is advisable to switch the pump on when the equipment is ready for applying the coating on the substrate and to switch the pump off immediately after the coating application. Extended use of the pump at high temperature can cause grease in bearings to dissolve and pipes to soften.

⚠️ When using a rubber mat with a heated table, do not allow the temperature of the table to exceed +50°C. Temperatures in excess of +50°C can cause the rubber to degrade.

Always bear in mind that the low thermal conductivity of the rubber material will tend to insulate the substrate from the heat of the table. A temperature probe placed on the top surface of the rubber mat will provide a more accurate measure of temperature than the temperature display on the front panel of the instrument (contact Elcometer or your Elcometer supplier for details of our wide range of digital thermometers).

7.1 Water heated table

Elcometer models 4340/11-, 110, 111 & 112 include a table designed to be heated by water (maximum temperature 100°C).

These models have a temperature display mounted on the front panel. This display does not *control* the temperature of the table, it only *displays* the temperature. The buttons and controls on the temperature display have no function.

⚠️ A red indicator will illuminate (when the Applicator is switched on) when the table is above 50°C.
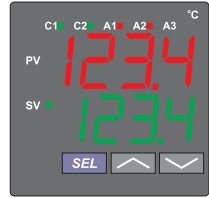
Do not touch the table when the red indicator is illuminated.

Control of the temperature of the hot water must be provided by an external water heating system (not supplied with the instrument).

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7.2 Electrically heated table

Elcometer models 4340/12-, 120, 121 & 122 include a table heated by electricity (maximum temperature 100°C or 200°C).

This model has a temperature display/controller mounted on the front panel.

⚠️ A red indicator will illuminate (when the Applicator is switched on) when the table is above 50°C.

Do not touch the table when the red indicator is illuminated.

Operation

1. To switch on the Applicator, press the green start button *and* the heat switch located below the hot surface temperature indicator.
2. The temperature display will show the current temperature of the table (PV).
3. To adjust the temperature of the table:
   - Use the ⌃ (increase) and ⌄ (decrease) buttons to adjust the set-point temperature (SV).
   - When the desired set-point temperature is displayed press SEL. The temperature PV will increase up to SV.
4. Place the substrate on the table and leave the Applicator and the substrate to reach the set temperature:

   At 50°C: allow 20 minutes
   At 100°C: allow 60 minutes
   At 200°C: allow 90 minutes

   The film applicator must also be heated to the correct temperature. This can be done in an oven or by placing the applicator on the table and leaving it long enough to heat through completely.

Note: The temperature of the table will always be slightly lower than the set point shown on the temperature controller. This is due to heat loss from the surface of the table. For accurate temperature measurement it is advisable to use a digital thermometer with a probe to measure the temperature of the surface directly.

Note: Take care and observe the following limitations when using a rubber mat on a heated table; the rubber has a maximum working temperature of 50°C and it will provide an effective layer of insulation between the specimen and the heated table.

8 MAINTENANCE

The Elcometer Motorised Film Applicator is designed to give many years reliable service under normal operating and storage conditions.

When the Applicator is not being used and has cooled (heated models only), cover the table using a specimen or other similar covering. This will help to protect the surface of the table from damage. If the table does become damaged by accidental knocking, etc., it may be possible to repair the damage by rubbing carefully using an oil stone.

Every six months, or sooner when used intensively, lubricate the two cylindrical carriage guide bars located inside the Applicator using machine oil.

The Applicator does not contain any internal user-serviceable components. In the unlikely event of a fault, the Elcometer Motorised Film Applicator should be returned to your local Elcometer supplier or directly to Elcometer. The warranty will be invalidated if the instrument has been opened.

Details of Elcometer offices around the world are given on the outside cover of these Operating Instructions. Alternatively visit the Elcometer website, www.elcometer.com

9 TECHNICAL SPECIFICATION

Carriage speed:	Adjustable from 5 mm/s to 100 mm/s (0.2"/s to 4"/s)
	High Speed version 10 mm/s to 150 mm/s (0.4"/s to 5.9"/s)
Operating voltage:	UK, 240 V AC 50 Hz
	EUR, 220 V AC 50 Hz
	US, 110 V AC 60 Hz
Power consumption:	100 W - standard model
	1600 W - models with electrically heated table
Fuse rating - plug (if fitted):	4 A
Fuse rating - machine:	2 x 1 A
Rating (electrically heated model):	10 A circuit breaker fitted (UK models)
	20 A circuit breaker fitted (US models)
Dimensions:	780 mm x 490 mm x 320 mm (30.7" x 19.3" x 12.6")
Weight:	29 kg (64 lb) - standard model

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10 ACCESSORIES

The Elcometer Motorised Film Applicator is complete with all the items required to get started. The following accessories are available from your local supplier or direct from Elcometer:

Description	For models	Part Number
Vacuum pump (UK, 240 V AC 50 Hz)	M100, M101, M102, M110, M111, M112, M120, M121, M122, M130	KTUK4930M001
Vacuum pump (EUR, 220 V AC 50 Hz)		KT004930M001
Vacuum pump (US, 110 V AC 60 Hz)		KTUS4930M001
Film Applicator Attachment (includes weight and hexagonal wrench)	M10-, M100, M101, M102, M130	KT004340N001
	M11-, M12-, M110, M111, M112, M120, M121, M122	KT004340N101
Spiral Bar Coater Attachment (includes weight, hexagonal wrench, matting and zero bar)	M10-, M100, M101, M102, M130	KT004340N002
	M11-, M12-, M110, M111, M112, M120, M121, M122	KT004340N102
Film Applicator and Spiral Bar Coater Attachment - Combined Unit (includes weights, hexagonal wrench and matting)	M10-, M100, M101, M102, M130	KT004340N003
	M11-, M12-, M110, M111, M112, M120, M121, M122	KT004340N103
Rubber Mat 150 mm x 140 mm	Spiral bar coater attachment	KT004350P051
Rubber Mat 510 mm x 250 mm	Spiral bar coater attachment	KT004350P052

11 RELATED EQUIPMENT

In addition to the Elcometer Motorised Film Applicator, Elcometer produces a wide range of other equipment for determining the physical characteristics of surface coatings. Users of the Motorised Film Applicator may also benefit from the following Elcometer products:

- Elcometer 4360 Spiral Bar Coaters
- Elcometer 3520 Baker Film Applicator
- Elcometer 3550 Bird Film Applicator
- Elcometer 3600 Doctor Blade Film Applicator
- Elcometer 3700 Doctor Blade Film Applicator with Reservoir
- Elcometer 3505 Cube Film Applicator
- Elcometer 4695 Leneta Test Charts
- Elcometer Wet Film Gauges

For further information contact Elcometer, your local supplier or visit www.elcometer.com