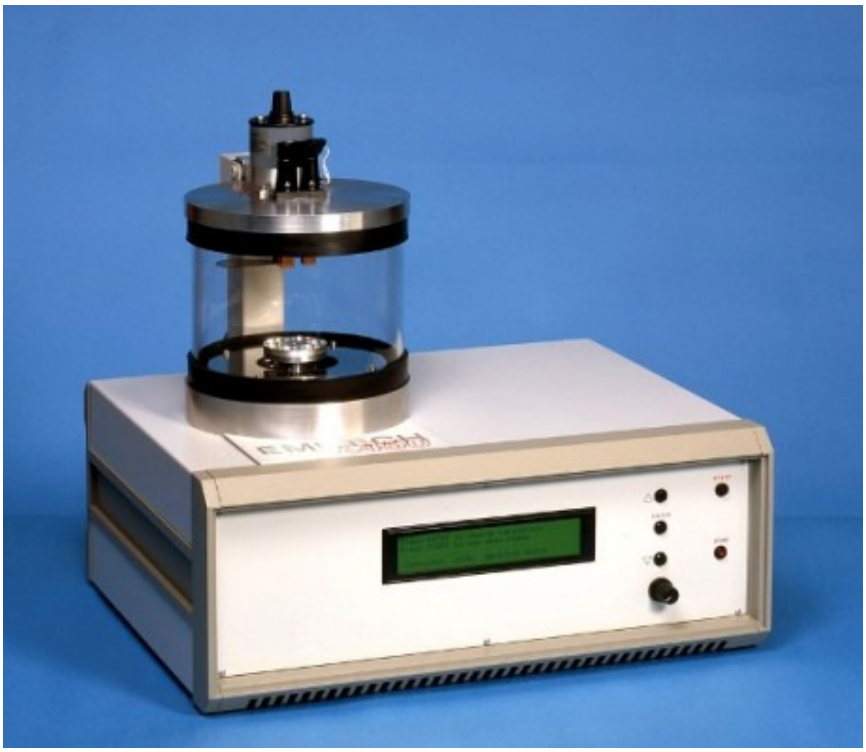
Quorum Technologies

K400X Carbon Coater
Instruction Manual



For technical and applications advice plus our on-line shop for spares and consumable parts visit www.quorumtech.com

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For further information regarding any of the other products designed and manufactured by Quorum Technologies, contact your local representative or directly to Quorum Technologies at the address above.

Disclaimer

The components and packages described in this document are mutually compatible and guaranteed to meet or exceed the published performance specifications. No performance guarantees, however, can be given in circumstances where these component packages are used in conjunction with equipment supplied by companies other than Quorum Technologies Ltd.

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C E Declaration

This Equipment of this Design and manufacture and marked CE, conforms to the requirements of the European Directives EMC 89/336/EEC & LVD 73/23/EEC.

This Equipment will “fail safe” in the presence of excessive RF, Electrostatic Discharge or Mains Transients. While a loss of function could occur under extreme circumstances the Equipment’s operation will be fully recoverable under normal operating conditions.

Mains Lead.

This Equipment must be Earthed and fitted with the correct lead for the country of operation. This will normally be achieved from the correct mains supply socket

Earth Connector.

This Equipment is normally supplied from 3-pin supply including Earth. If only 2-pin supply is available a separate Earth must be fitted. The supplementary Earth stud can be used to facilitate this requirement.

Output:

This is for the pump supply only and is the mains voltage at a maximum of 8 Amps.

1. Description

The K400X uses several carbon fibre types to cover a range of deposition thickness' operating at rotary vacuum pressures. Coating is omni-directional, and this semi automatic system has a relatively short cycle time of less than 5 minutes.

The system employs low voltage, high current electrodes, between which the carbon fibre is located. The electrode assembly employs a protective shutter to protect the specimen from heat damage during the timed out-gassing of the carbon fibre process. At completion of this process, the shutter is manually retracted, and full power is applied to the electrodes, causing the carbon to burn quickly or 'flash' the fibre fusing as part of the process

2. Installation

It is important that this equipment is installed and operated by skilled personnel in accordance with these instructions. Failure to do so may result in damage, and impair protection provided. 'If in doubt - ask'.

A suitable location should be provided for the unit - either operated on a bench or the recommended trolley. The total weight of the system is 25 Kg. The system operating environment ambient temperature range is 15^{O}C to 25^{O}C in a non-condensing relative humidity of not more than 75%. Sufficient ventilation is required, and positioning should be out of direct sunlight. The system is rated for continuous operation other than those supplies specified.

2.1 Preliminary Checks

Remove Instrument from packing and place on appropriate operational position. Carry out visual inspection for any signs of transit damage.

Remove Accessories Pack and check contents against K400X Accessories Pack Shipping List.

Ensure that all areas of the Instrument are free of loose packaging material. Check specifically the Instrument chamber, glass cylinder, and 'L' gaskets. (Do not use vacuum grease on gaskets.)

Where a vacuum pump has been supplied, carry out preliminary checks in accordance with manufacturers recommendations. (Refer to: Appendix 7.4, Pump Plug wiring)

NOTE: If you are using existing or alternative vacuum pump, and have any difficulty with connections, please seek advice.

2.2 Connections.

Connections should only be made in accordance with instructions. Refer To: Appendix 7.1 Rear Panel Drawing

UNDER NO CIRCUMSTANCES SHOULD ANY OTHER CONNECTIONS OR OUTLETS/INLETS BE USED FOR ANY OTHER EQUIPMENT OR SERVICES.

TITLE	FUNCTION
Rocker Switch/ Power Inlet/ Fuseholder	Main power on to Instrument.
Pump Out	Power out to pump controlled by Instrument
Gas Inlet	Process gas inlet supply from low-pressure regulator.
Coating Outputs	LT output to coating electrodes.
Fuse 2	Fuse for L.T. coating power supply

NOTE: A dry inert process gas may be used to improve contamination. However, satisfactory results can be achieved with air.

For fuse ratings and voltages refer to: Appendix 7.3 Fuse Listings

NOTE: Any other items on rear panel not listed are for common manufacturing and are not available for this Instrument.

NOTE: - A single phase AC supply with Earth is required - selected to the correct voltage for the country of operation, either nominal 240V or nominal 120V. The voltage and frequency range is:

Nominal 240	Max. Current 10A	200 - 264V	47Hz To 63Hz
Nominal 120	Max. Current 20A	90V - 132V	47Hz To 63Hz

If required carry out vent gas connections to rear panel (Refer To: Appendix 7.1, Figure 1) with tubing and connectors provided. The connector is push-fit and will 'snap' into a locked position. It can be released by depressing the metal tongue. Dry Nitrogen gas is recommended at a nominal pressure of 4psi.

The electrical input to the Instrument is made with the power lead provided. The Instrument connection is standard and the lead is fitted with the appropriate plug for the country of operation.

Ensure the plugs are firmly located. Check the voltage is correct voltage for country of operation, which should correspond to the voltage label on the Instrument. The appropriate electrical supplies for countries are given in Appendix 7.7 World wide Electrical Supplies

The vacuum connection is made by 1 Metre length of vacuum hosing. This is a push-on fit to the Instrument. Ensure that this is firmly in place to the full length of the vacuum connector.

NOTE: If you are using existing or alternative vacuum pump, and have any difficulty with connections, please seek advice.

An Oil Mist Filter with metal adapter should be fitted to outlet of vacuum pump (See Section 6 Spares and Accessories for a suitable type).

Check that the vacuum pump is filled with correct oil (See Section 6 Spares and Accessories for suitable type). If the vacuum pump is fitted with an ON/OFF switch, ensure that it is left in the 'ON' position, as the Instrument will carry out required control.

Ensure that the LT connectors to the lid and rear panel are firmly in place.

2.3 Initial Operating checks

(These should be made having become familiar with the controls. Refer to Section 3, Operation)

ALL SUPPLIES ARE CONTINUOUSLY RATED WITH THE EXCEPTION OF THE L.T. SUPPLY - SEE NOTES BELOW.

The following checks are carried out **without** an evaporation source between the electrodes. Check manually that the shutter moves freely by rotating.

Switch power on with rocker switch located on rear panel of Instrument. The LED in the STOP switch should illuminate showing power to the instrument, and the LCD should show the following display:

```
Press ENTER to change parameters
Press START to run when ready
```

Check process gas by operating stop. The process gas cylinder output gauge will drop slightly. The K400X lid will lift 'slightly' when chamber fills with gas.

NOTE: If only using air, listen for valve operating.

When the display has returned to the initial layout as above press the START key. The rotary pump will start and the chamber vacuum reading should achieve 5 x 10^{-1}mbar within 1 minute maximum (the outgas trip point).

```
Pumping to 5x10-1 mbar


Vacuum:  8x10-1 mbar
```

Providing Pump Hold is NOT enabled (see Section 3.5 Pump Hold Feature) the outgas portion of the cycle will commence. The screen display should look like that shown below.

```
Outgassing Cord
Time Remaining   00:00:21  H:M:S
  Vacuum:        Current ( Amps )
 8x10-1 mbar           5
```

The system will continue pumping with voltage applied to electrodes for the programmed time - default 30 seconds.

NOTE: The carbon variable (outgas) control is rated for a max. 10A for 2 minutes, with a duty cycle of 25% (off time - 4 minutes) the carbon 'flash' (full power) is rated for full power for 5 seconds, with a duty cycle of 2% (off time - 4 minutes.)

CAUTION: The electrodes become very hot during the coating process and may cause burns.

The system will continue pumping for at least another minute, and then providing the vacuum is better than $3x10^{-1}$ mbar (the default evaporate trip point).
For a few seconds before the actual evaporation takes place the text "**About to evaporate cord**" will flash on the LCD display, the shutter should be moved aside, and the evaporation source will be enabled. At which point full power is applied.
After this the rotary pump will stop and the system will vent to atmosphere.

2.4 Setting Up Outgas Current

It may be good practice to set up the outgas current in advance of coating a sample. To do this the above procedure is adopted. However, a source of Carbon Fibre should be placed between the electrodes. This should be the Carbon that is going to be used normally e.g. 1 x Cord or if all are going to be used these initial checks can be done for all options, i.e. 1 x Cord, 2 x Fibre and 3 x Fibre.

Turn outgas control knob to minimum and insert source between the electrodes. Start a cycle as normal. When the outgas portion of the cycle is reached adjust the current until the source can be observed glowing red-hot. Note the vacuum may fall away slightly.

Make note for setting for future reference, repeat for other sources as required.

Having initially found out settings, these can be set in advance for subsequent operations of the unit.

3. Operation

These are the controls by which the instrument is operated. Refer to Appendix 7.2 Front Panel Drawing.

Front Panel Controls	
Start	The start button initiates the control sequence.
Stop	The stop button stops the current cycle when the instrument is running. Or cancels the current selection when editing values.
Up, Down.	These buttons either increment or decrement the value of the current variable when in the change parameters menu.
Enter	This button accepts the current value when in the change parameters menu.

3.1 Setting Operating Parameters

There are a number of user programmable options that can be altered by the front panel keys. These are: -

Parameter	Allowable Values	Description
Outgas Time	0 - 60 Seconds	
Evaporate Time	0 - 2000mS in 50mS steps	Time allowed for the evaporation of the cord.
Pump Hold Enabled	Yes/No	Whether extra pumping is enabled or not. Default - No
Pump Hold Time	0 - 8 Hours in 5 Seconds Steps	How long extra pumping will last, default 10 Minutes
Vent Time	0 - 4 Minutes in 5 Seconds Steps	Time allowed to vent the chamber at the end of the cycle
Stage Rotate Enabled (Not available on K400X)	Yes/No	Rotate the specimen stage during the coating, default - No

When options are modified, the software will by default save these so that they are in force the next time that the instrument is powered up.

3.2 To Check Or Modify Parameters:

From the main menu press the ENTER to select the change parameters menu. The screen below should appear on the LCD.

UP or DOWN key to ALTER
ENTER to accept, STOP to return
Variable Name Current Value

For most parameters the value is shown along with the variable name. Use the UP or DOWN arrow keys to amend the value as required. When the required value is shown press the ENTER key to accept. To exit from the parameter editing menu press the STOP key.

3.3 Cycle Sequence

The suggested parameters which should be satisfactory for general applications are as listed.

- Carbon cord x 1
- Outgas at approx. 5A for 30 seconds at Red heat. Out-gassing at $2x10^{-1}$ mbar.
- Process gas (If nitrogen used) at 4psi.
- Evaporation (Automatic) at $7x10^{-1}$ mbar.

Typical coating thickness: up to 50nm (500angstroms) outgas current approx. 5amps, top end of 'Red heat'.

NOTE: These conditions for coating thickness can be more readily determined by referring to the K400X Deposition Chart (Appendix 0) allowing for spacing of any stub and specimen height when reading final settings.

3.4 Coating A Specimen.

First select the appropriate carbon evaporation source. (String/Cord etc.).

NOTE: For two or three carbon string, twist together to form one source.
2 x Folds should give approx. 5nm thickness.
3 x Folds should give approx. 10nm thickness.
For carbon cord, **only** use as single length.

1. Fit carbon source in 'straight' length between electrodes. The electrodes have spring loaded contact clamps in which the ends of the carbon source can be loaded by positioning in the slot in the electrode. Trim any surplus carbon source either side of the electrodes.
2. Close lid and operate pump-start.
3. When vacuum of $5x10^{-1}$ mbar is reached, outgas will operate. The carbon source should glow "bright Red". (If this Red condition cannot be achieved, outgas can be finely adjusted as described in Section 2.4). During the outgas process; the vacuum may fall below the 'trip point'. The Instrument will automatically re-set outgas when the vacuum recovers.
4. At the end of outgas period, the Instrument will pump to $7x10^{-2}$ mbar in approximately 60 seconds at this point the shutter should be opened. Full power will be applied to the electrodes, "flashing" the carbon source, which will break, or "blow" as part of the process.
   CAUTION: THIS IS ACCOMPANIED BY A BRIGHT WHITE FLASH, AND SHOULD NOT BE VIEWED DIRECTLY WITH THE NAKED EYE.

After the "flash" process, the shutter will close, and the Instrument will stop the pump and vent automatically. Further venting can be achieved, if necessary, by manually operating vent-stop. In addition, the cycle can be aborted at any time by the same action.

To repeat a run, lift chamber lid so that electrodes can be reloaded with a carbon source.

CAUTION: AVOID TOUCHING THE ELECTRODES, WHICH MAY STILL BE HOT.

Remove specimen before removing carbon debris and cleaning terminals with 'toothbrush' or similar. Take care not to have any debris in chamber, or on 'L' gasket seals, by using a dust-off or similar.

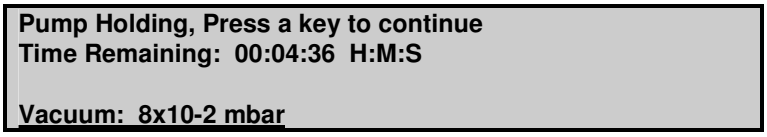
NOTE: If hold-inhibit is used, the Instrument will continue pumping, and will not 'flash' the carbon source refer to Section 0

3.5 Pump Hold Feature

The Pump Hold feature is used for one of two conditions.

1. If it is required to outgas a specimen more than would be possible during the normal automatic cycle, then select Pump Hold as enabled in the parameter menu. This will inhibit the cycle from continuing until either, a key is pressed, or the stored Pump Hold time elapses, whereby the cycle will continue in the normal manner. The vacuum should eventually achieve better than 7 x 10^{-2} mbar.
2. If it is required to use a K350 for sputter coating, then select Pump Hold and select a fairly long time, perhaps longer than 30 minutes. The K400X is now used as a vacuum chamber for sputtering head. After sputtering has completed press the Stop button on the K400X. **NOTE: For full details consult separate K350 Instruction Manual.**

When Pump Hold is enabled, the instrument will pump to the outgas trip point as normal, then the pump hold feature becomes active. The display should look like that below.



The pump hold time can be programmed for up to 8 hours. As stated above the instrument will continue pumping until either the time elapses or, a key is pressed. The cycle will then continue as normal.

The cycle can be terminated at any during the cycle by pressing the STOP button. On doing so the cycle will terminate in the normal manner by stopping the pump and venting the chamber.

4. Coating Protocols

The following is only a brief outline and guide. For further details consult Section 8 References.

The K400X is primarily to produce relatively 'thick' coatings for X-ray microanalysis. Operating at rotary pump vacuum, the coatings are omni-directional, coating uneven surfaces.

In such applications it would be common to use carbon mounts. These may be a range of carbon stubs replicating the more common Aluminium, or carbon discs mounted on Aluminium stub.

The main classification of specimen types is between 'bulk' and 'particulate'.

In the case of 'bulk' specimens a good bonding to the stub is required. In addition, although an omni-directional coating is expected, the under-side of a very irregular specimen may not receive a good coating. Suitable adhesives, which are electrically conductive, can be used with effect. Silver Dag, a Silver loaded conductive paint, is commonly used, with graphite Dag as an alternative specifically for X-ray work. To achieve a somewhat more substantial bonding, Silver loaded epoxy, which has good strength and electrical conductivity, is advantageous.

In the case of 'particulate' specimens, depending on the nature, again a thin layer of silver Dag is suitable with the specimens 'sprinkled' on it. Alternatively, a cyanoacrylate or double-sided adhesive tape can be used.

In both cases the mounting medium is of low profile. The carbon coating should be sufficient to make electrical contact with the specimen and stub. If this is not the case, such as specimens on glass slides/coverslips, it may be necessary to bond using one of the previously mentioned conducting adhesives.

Whilst the Instrument is primarily for 'thick' coatings, 'thin' coatings can be achieved by careful choice of coating conditions. Also, while the granularity of such coatings for X-ray analysis may not be important, it is possible to improve somewhat by improving the vacuum. In such cases, it is recommended that an inert process gas (dry Nitrogen) is used, and a higher vacuum is obtained by utilisation of the “pump hold” facility.

5. Service and Maintenance

5.1 Maintenance

Procedure	Weekly/Monthly
Cleaning inside vacuum chambers. Metal Parts Including Aluminium Stainless steel and Copper parts: Manually polish using either metal polish to remove deposits. Wash polish residue away by ultrasonically cleaning or rinsing in Iso-Propanol Alcohol (IPA), or wiping with IPA then allow to dry thoroughly. Check for damage, dust and deposits. Wipe clean with a lint free cloth soaked in IPA and allow to dry. Do not use grease on gaskets.	Monthly
Check Oil Mist Filter for saturation. Change every 6 months, or more regularly as required. (See Section 6 Spares and Accessories for suitable part) (This is a disposable plastic filter and cannot be reactivated.)	Monthly
In addition to inter-run removal of debris, regular cleaning of the electrodes and surrounding area is recommended. A foam cleanser can be used to clean electrodes, PTFE (plastic) parts, and chamber lid. The electrodes may be lightly polished using 'Wenol' or similar. Particular attention should be paid to the spring loaded contact clamps by removing the 'hard' deposits with a 'stiff' brush. Also ensure the contact clamps can move freely.	Weekly
Depending on frequency of use, if by examination the spring loaded contact clamps appear to be losing tension and electrical contact, the springs should be changed. (A spare set of springs and electrode 'O' rings is provided with the Instrument in the free issue kit). To change the spring, unscrew the retaining screw. The spring and clamp can be removed. The opportunity should be taken to thoroughly clean and polish all faces of the electrode, and also the contact clamp. Fit new spring and re-assemble, ensuring clamp can open sufficiently on the electrode.	6 Monthly
Regularly inspect electrical power cords and plugs for general condition	Regularly

CAUTION: Ensure mains electrical power is off during any maintenance and service activities.

NOTE: Consumable items can be obtained from Emitech or approved Distributor**. Only Emitech recommended items should be used. For technical assistance and advice - contact Emitech.

EM Technologies Ltd.,
South Stour Avenue,
Ashford,
Kent, TN23 7RS.
England.
Tel: +44 1233 646332
Fax: +44 1233 640744

**If approved Distributor not known - please contact Emitech direct for details.

5.2 Troubleshooting the K400X

Routine service should not be necessary. In the event of non-operation, carry out the following checks.

IMPORTANT: Depending on nature of problem, disconnect power cord BEFORE carrying out any servicing activities.

Check electronic supplies: The LED in the STOP switch should be on at power up.

Check fuses: Refer to Appendix 7.3 Fuse Listings

Check vacuum pump: Local switch should be in 'On' position.

Check chamber seating for vacuum leaks.

Check operating conditions of Instrument controls.

Check carbon source is making good contact.

Check correct conditions for outgas have been set.

Check all connections.

Check that the LCD is showing the correct display.

Check Pump Hold Enabled is set to NO.

In the event of all checks proving negative, please contact Emitech, or your local Distributor**.

An advance delivery modular exchange service scheme is operated for the complete single module control electronics.

This can normally be customer installed in accordance with instructions provided.

NOTE: Spare items can be obtained from Emitech or approved Distributor**. Only Emitech recommended items should be used. For technical assistance and advice - contact Emitech.

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6. Spares and Accessories

The following are available from Emitech, or your local distributor, and are featured in more detail in the current Emitech Consumables Catalogue. Copies can be sent on request

6.1 Spares

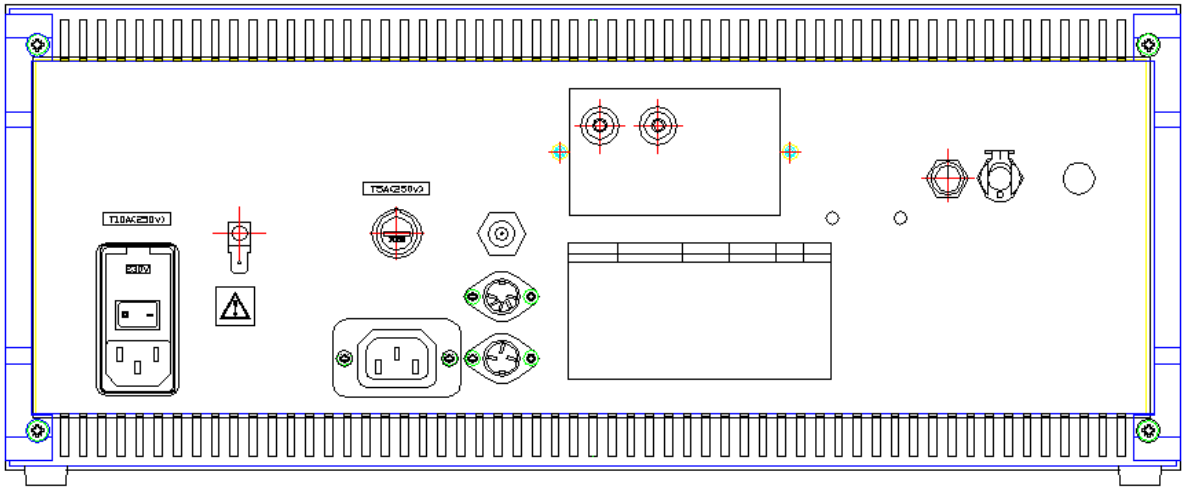
The following are available from Emitech, or your local Distributor, and are featured in more detail in the current Emitech Consumables Catalogue. Copies can be sent on request.

Spares For K400X Sputter Coater	Catalogue Number	Quantity
Carbon Fibre	C5461	1 Metre
Carbon Cord	C5421	1 Metre
Glass Cylinder 6"	G6260	Each
'L' Gaskets to suit	G6261	Pair
Oil Mist Filter	O7803	Each
Supergrade 'A' Rotary Pump Oil	O7802	1 Litre

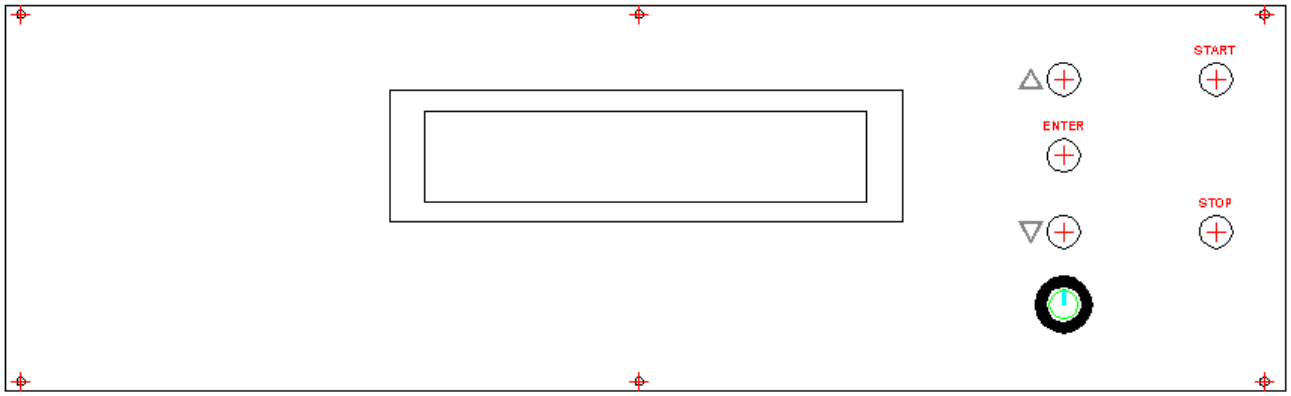
Useful Accessories For K400X Sputter Coater	Catalogue Number	Quantity
Amberclens Foam Cleanser	C5427	Each
Conducting Carbon Cement (Leit-C)	C5440	30g
Silver Conductive Paint	A5001	3g. Bottle
Silver Loaded Epoxy	A5002	2x15g.
Cyanoacrylate Adhesive Grade C2	A5003	5x5g.
Cyanoacrylate 'Superglue'	A5005	3g. Tube
Double Sided Adhesive Tape	T8803	20 m. Roll
‘Dust-off plus’ Can Complete	C5454	Each
Wenol Polish	C5424	100ml tube

7. Appendices

7.1 Rear Panel Drawing



7.2 Front Panel Drawing



7.3 Fuse Listings

Fuse Listing - 230 Volts

Title	Rating	Function
Fuse 1 (1.25" X 0.25")	**T 10A Ceramic**	**Main Power, located in inlet unit.**
Fuse 2 (1.25" X 0.25")	**T 10A Ceramic**	**L.T. Power supply fuse. Located in evaporator control PCB.**

Fuse Listing - 115 Volts

Title	Rating	Function
Fuse 1 (1.25" X 0.25")	**T 15A Ceramic**	**Main Power, located in inlet unit.**
Fuse 2 (1.25" X 0.25")	**T 15A Ceramic**	**L.T. Power supply fuse. Evaporator control PCB.**

T10A is preferred fuse by.
May be substituted 10A Slo-Blo Ceramic Fuse - Non-preferred.
Fuse Standard IEC 127, CEE4.
Fuse Standard CSA C22.2/UL 198G *
EMITECH, or the approved distributor** can supply replacement fuses.

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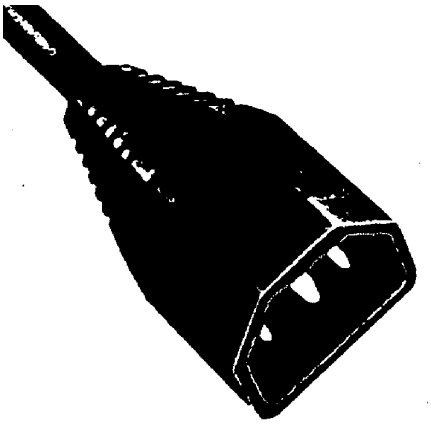
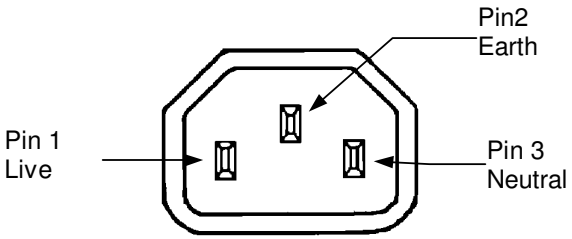
FAX: 01233 640744 (+44 1233 640744)

** If an approved distributor is not known - please contact Emitech direct for details.

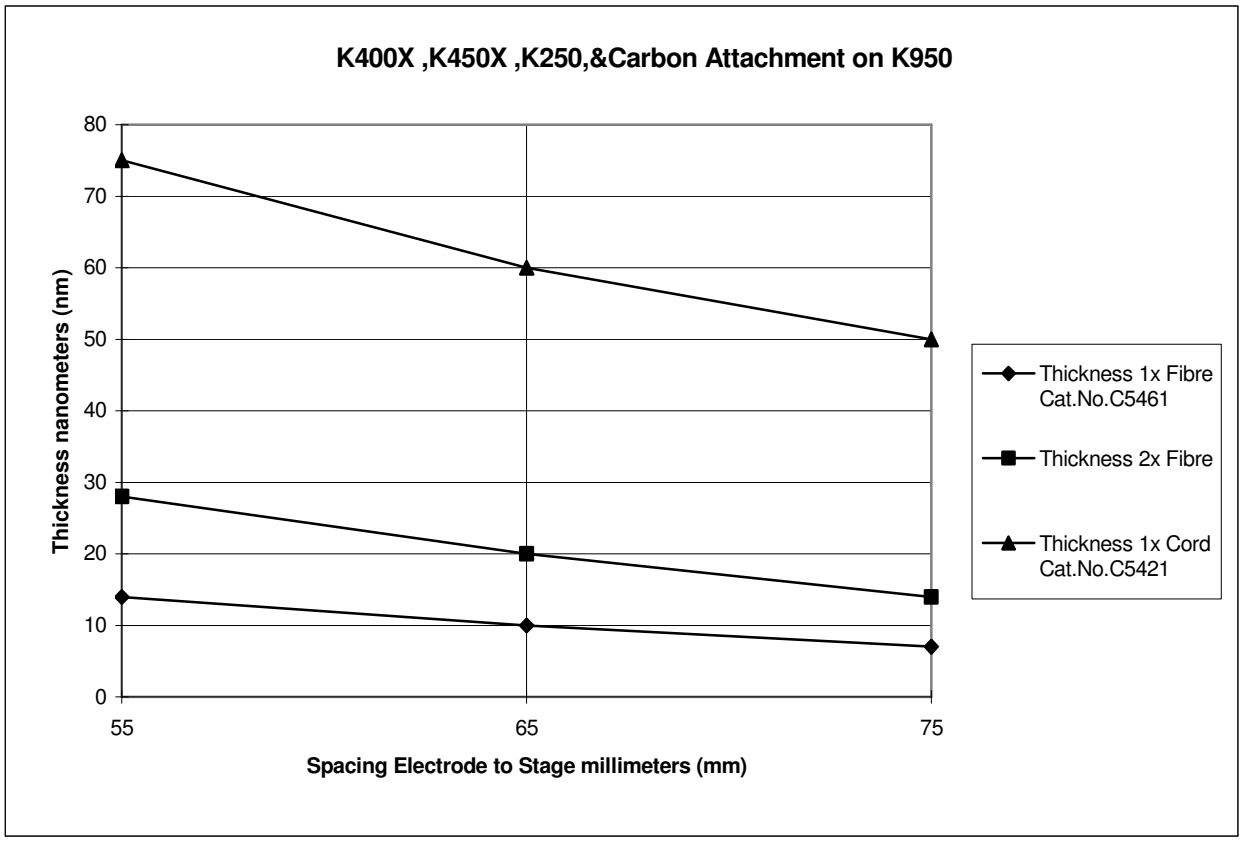
7.4 Pump Plug wiring





	UK and Europe	U.S.A. and Canada
Pin 1 (Live or Hot)	Brown	Black
Pin 2 (Earth)	Green / Yellow	Green
Pin 3 (Neutral)	Blue	White

7.5 Graph Showing Expected Coating Thickness



The following can also be used as a guide for determining the deposition thickness. The thickness given are for carbon deposited on polished brass.

Thickness (nm)	Colour
15	Orange
20	Indigo Red
25	Blue
30	Bluish Green
35	Green Blue
40	Pale Green
45	Silver Gold

This is as published in Cambridge University Press 1975. “Electron Microprobe Analysis”, S.B.J. Reed, First Edition.

7.6 K150X FTM Option

The K400X can be used with a film thickness monitor, which measures the thickness of coating deposited on a crystal in the chamber, and hence calculates the thickness deposited on the sample to give qualitative repeatable coatings.

With the K400X the FTM can only be used in MANUAL mode. In manual mode the FTM is enabled so that it can count the deposition and is disabled at the end of the coating process.
For further information see the K150X manual.

7.7 World wide Electrical Supplies

Country	**AC Volt/Freq.**
Brazil	220V/60Hz
Canada	115V/60Hz
France	220V/50Hz
Germany	220V/50Hz
India	230V/50Hz
Ireland	230V/50Hz
Israel	230V/50Hz
Italy	220V/50Hz
Korea	115V/60Hz
Japan	100-200V/50Hz-60Hz
Netherlands	220V/50Hz
Norway	220V/50Hz
Pakistan	230V/50Hz
Portugal	220V/50Hz
Scandinavia	220V/50Hz
Singapore	240V/50Hz
Spain	220V/50Hz
Taiwan	220V/60Hz
Turkey	220V/50Hz
United Kingdom	220-240V/50Hz
United States of America	115V/60Hz

8. References

1. HOLLAND, L.

"Vacuum Deposition of Thin Films."
Chapman and Hall, London, 1970

2. ECHLIN, P. and SAUBERMANN, A.J.

"Preparation of Biological Material for X-Ray Microanalysis."
SEM-1977, I, 621-637.

3. MUNGER, B.L.

"The Problem Of Specimen Conductivity In Electron Microscopy."
SEM-1977, I, 481-490

4. PETERS, KLAUS-RUDIGER.

"Precise And Reproducible Deposition Of Thin And Ultrathin Carbon Films By Flash Evaporation Of Carbon Yarn In High Vacuum.
J. Microscopy 1984 Vol 133 Pt 1, 17-25.

5. ECHLIN, P.

"Coating Techniques For Scanning Electron Microscopy And X-Ray Microanalysis."
SEM, I, 1978.
(AVAILABLE ON REQUEST)

Safety information for the return of Preparation Equipment and Accessories.

General Introduction

The employer (user) is responsible for the health and safety of his employees. This also applies to all those persons who come into contact with the Preparation Equipment and Accessories either at the user or manufacturer's premises during repair of service. The contamination of Preparation Equipment and Accessories has to be declared and the Health and Safety Declaration form completed.

Health and Safety Declaration

Those persons carrying out repair or service have to be informed of the condition of the components. This is the purpose of the 'Declaration of Contamination of Preparation Equipment and Accessories.'

Despatch

When returning equipment the procedures set out in the Operating Instructions must be followed. For example:

- Drain the vacuum pumps.
- Neutralise the flushing with gas.
- Remove filter elements.
- Seal all outlets.
- Pack glass components safely.
- Pack loose attachments securely for example stages.
- Seal in heavy-duty polythene or a bag,
- Despatch in suitable transport container.

Return Address:
F.A.O.: The Service Manager,
EM Technologies Ltd,
South Stour Avenue,
Ashford,
Kent.
TN23 7RS.

Declaration of Contamination of Preparation Equipment and Accessories.

The repair and/or service of Preparation Equipment and Accessories can only be carried out if a correctly completed declaration has been submitted. Non-completion will result in delay. The manufacturer reserves the right to refuse acceptance of consignments submitted for repair or maintenance work where the declaration has been omitted.

This declaration may only be completed and signed by authorised and qualified staff.

1. Description of component	**2. Reason for return**:
- Equipment type/model: _____ - Code No:. _____ - Serial No.: _____ - Invoice No. (if known) _____ - Delivery Date.: (if known)_____	_____ _____ _____ _____ _____
3. Equipment condition - Has the equipment been used? Yes/No - What type of operating medium was used? _____ - Is the equipment free from potentially harmful substances? Yes/No (If Yes go to Section 5) (If No go to Section 4)	**4. Process related contamination of Equipment/ Accessories.** - Toxic Yes/No - Corrosive Yes/No - Explosive* Yes/No - Microbiological* Yes/No - Radioactive* Yes/No - Other harmful substances Yes/No

* We will not accept any Equipment/Accessories that have been radioactively, explosively, or microbiologically contaminated without written evidence that such Equipment/Accessories have been decontaminated in the prescribed manner.

Please list all harmful substances, gases and dangerous by-products, which have come into contact with the Preparation Equipment and Accessories.

Trade name Product name Manufacturer	Chemical name and symbol	Danger class	Precautions associated with substance.	First aid measures in the event of an accident.
1.				
2.				
3.				
4.				
5.				

5. Legally Binding Declaration.

I hereby declare that the information supplied on this form is complete and accurate. The despatch will be in accordance with the appropriate regulations covering Packaging, Transportation and Labelling of Dangerous Substances.

Name of Organisation: _____

Address: _____

_____ Post Code: _____

Tel.: _____ Fax.: _____

Name: _____ Job Title: _____

Date: _____ Company Stamp: _____

9. Document History

Issue	Date	Details	Revised By
1	07/02/2000	Initial Issue for new instrument	DJR
2	14/08/2002	Corrected errors from first issue	PRM
3	04/11/2003	Revision	JB