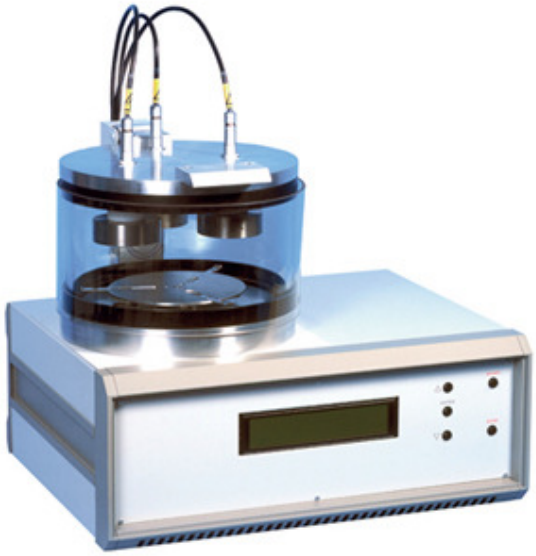
Quorum Technologies

K650XT Sputter 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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C E Declaration:

This Equipment of this Design and manufacture and marked CE, conforms with 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.

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.

INDEX

1. Description

The K650XT system employs a Magnetron Target Assembly which enhances the efficiency of the process using low voltages, and giving a fine grain, cool sputtering, without the need to cool the target or the specimen stage.

There are three such target assemblies in the K650XT, positioned to give coating over a large diameter which, together with a rotating sample table, ensures even depositions. This method allows standard targets to be utilised, and avoids the necessity of special large profile targets.

The Instrument is fitted with three 60mm Dia. x 0.1mm. Thick Gold quick change target giving optimum consumable cost performance.

The integrated instrument panel and plug-in electronics, maximise 'up-time' and, with user friendly designs, ensures satisfactory multi-user discipline.

The sputtering parameters can be pre-set, including the gas bleed needle valve, which has electromagnetic valve back-up. This together with automatic control, gives defined and repeatable film thickness depositions.

The sputtering head is interlocked, and the system can easily accommodate a K250 Carbon Coating Attachment.

The independent vacuum pump is controlled by the Instrument throughout the fully automatic coating cycle.

The system can also be fitted with a film thickness monitor (F.T.M.) as an "optional extra" for certain applications.

The system can also be fitted with a vacuum shutdown option allowing the instrument to be pumped down and switched off, with the chamber left under vacuum.

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 K650XT 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 advise.

2.2 Connections.

Connections should only be made in accordance with instructions. Refer To: Appendix 7.2 Rear Panel Drawing
UNDER NO CIRCUMSTANCES SHOULD ANY OTHER CONNECTIONS OR OUTLETS/INLETS BE USED FOR ANY OTHER EQUIPMENT OR SERVICES.

Title	Function
Power Inlet / Power on rocker Switch	Main power inlet socket, with integral on/off switch and fuseholder. For Fuse ratings - See Appendix 7.3
Pump Electrical Supply Outlet	Power out to pump controlled by Instrument. If the pump has it's own ON/OFF switch, ensure that this is in the ON position so that the control can be performed by the instrument
Argon Gas Inlet	Process gas inlet supply from low pressure regulator
Nitrogen Gas Inlet	Pre-regulated purging gas inlet supply.
Vacuum Outlet	Vacuum connection from turbo pump to backing pump

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

Carry out process gas connections to rear panel (Refer To: Appendix 7.1 Figure 2) 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. Argon gas is recommended at a nominal pressure of 4 p.s.i.

If only one process gas is used, the gas inlet 1 and gas inlet 2 have an external 'T' piece with restrictor in the gas inlet 2. Gas inlet 2 can then be used for the restricted venting at the end of a run.

If two process gases are used then gas inlet 1 is used for purging, and gas inlet 2 would **not** have the 'T' piece, but would have the restrictor and gas inlet 2 can then be used for the restricted venting at the end of a run.

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.

2.2 Connections.- Continued.

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

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 & 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 HT connector to the lid is pushed firmly in place.

WARNING: The Instrument should **NOT** be operated with **ANY** of the HT leads disconnected.

3. Operation

3.1 Controls Refer to Front Panel Diagram 7.1 Fig 1

Title	Function
Start	Non-latching switch starts the instrument cycle
Stop	Non-latching switch, terminates the instrument cycle or parameter editing, or when idle initiates a chamber purge period
Enter	Non latching button used to enter new settings.
Up ⮝ and Down ⮟ Arrows	Used to increase or decrease a setting i.e. current, time etc., or to change the current option from a menu of items
Emergency stop button (Option)	This is a latching switch mounted at the front of the instrument and is operated by pressing at any time. It cuts the power to the instrument. To reset the switch it must be pulled up

When the power is switched on at the rocker switch located on rear panel of Instrument. The front panel LCD display should illuminate and show the initialising message and, the software version and creation date similar to that shown below.

```
K675XT Version 1.00 (c)Emitech 11/07/99
Initialising - Please Wait
```

Once the instrument hardware and software has been initialised the main opening screen will be displayed, which is shown below.

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

3.2 Settings

It is possible for the user to change some of the parameters which affect the running of the instrument. Pressing the ENTER key from the opening menu will enter the parameter select menu. The display will look similar to that below. The settings are subdivided into those that affect the sputtering directly i.e. sputter time and sputter current etc., FTM parameters (for those instruments that are not fitted with this option 'FTM enabled' is the only item of interest and this should be set to Disabled), and the Miscellaneous parameters which include Stage rotate enable etc. A full list of the settings that can be changed, their default values and the menu they appear in can be seen in the appendices of this document.

```
Press ENTER to change parameters
Press START to run when ready
  >  Sputter Coating   <      Miscellaneous
         FTM
```

Assuming that it is required to change the sputter current, the ENTER key is pressed to select the item highlighted by the arrows. The required item to be changed can be accessed by stepping through the parameters using the ENTER key. When the required item is shown on the display use the UP or DOWN arrow keys to change as desired. The display will look like that below

```
UP or DOWN key to ALTER
ENTER to accept, STOP to return

Sputter Current    125 mA
```

3.2 Settings - Continued

The parameters have pre-programmed maximum and minimum values. If say the maximum is reached and the UP key is pressed again the value will rollover to the minimum, and vice-versa.
When the required new value has been reached press the ENTER key to accept it. At any time it is possible exit the change parameter menu back to the opening screen by pressing the STOP key. Any parameters that are changed will retain their new value in an internal battery backed memory when the instrument is switched off.

3.3 Initial Operating Checks

These should be made having become familiar with the controls. For the first run, it is best if the instrument is tested with the factory set default parameters.

From the top level menu it is possible to check the process gas by pressing stop button. Check input pressure remains at 0.7 bar (10 p.s.i.). The process gas cylinder output gauge will drop slightly. Now try and run a test cycle by pressing the start button. If the instrument has been specified to have vacuum shutdown capability then the screen will produce a menu allowing the choice of running a sputter cycle or a vacuum shutdown cycle (as shown below), otherwise the instrument will immediately commence running the cycle

```
UP or DOWN key to ALTER
ENTER to accept, STOP to return
          >  Sputter Coat    <
             Vacuum Shutdown
```

When this display is shown the initial choice always defaults to sputter coating. Press ENTER to accept this and allow unit to run through a cycle. The actual sections of the cycle are described in the next section.

When the instrument has pumped down and the valve is opened to bleed in the process gas, note the vacuum reading, a vacuum between $1x10^{-2}$ and $5x10^{-3}$ should be achieved by the time the sputter clean cycle commences, approximately $7x10^{-3}$ mbar is ideal. If necessary adjust needle valve (located at the rear of the box) to achieve this. The vacuum may fall slightly during coating.

Observe Instrument completes the full automatic cycle, and afterwards vents the chamber sufficiently so that the chamber lid can be lifted.

NOTE:

The sputter cycle is rated for a max. 1o0mA for 4 minutes, with a duty cycle of 50% (off time - 4 minutes). The default settings of 60mA and 30 seconds should give sufficient coatings of Gold for most S.E.M. work. See also deposition chart section 6.7

3.4 Sequence

The sequence of events for a typical oxidising target material coating run is shown below. Where the cycle deviates from this for when using a noble target material or due to options fitted these will be described.

3.4.1 Start

If stage rotate during coating has been enabled the cycle starts by rotating the stage for three seconds purely to ensure that the sample is in a secure position and will not fall off during the coat cycle. This is to save having to wait for the pump down cycle before finding this out.
The cycle then continues with the pump to high vacuum section. The rotary pump is started to 'rough pump' the chamber for 10 seconds, then the purge valve will open to flush the chamber with gas for 25 seconds. After the flush time the gas valves will close and pumping to high vacuum will start.

3.4.2 Pumping To High Vacuum

Pumping will commence with the rotary pump switching on; after five seconds the turbo pump will start. The display will look like that shown below.

```
Pumping to  5x10-1 mbar


Vacuum   9x10+1 mbar          Turbo Speed  35 %
```

3.4.2 Pumping to High Vacuum - Continued

When the target vacuum has been reached pumping will continue for a further 3 minutes, to improve the vacuum and allow the turbo pump to reach full speed. The display will show a countdown of the remaining time as shown below.

```
Improving Vacuum
Time Remaining: 00:02:47

Vacuum   9x10+1 mbar            Turbo Speed   35
%
```

When the full three minutes has elapsed, if pump hold is enabled this is executed, otherwise the cycle continues with gas bleed. By this time, the vacuum should have reached “High Vacuum”, depending on the type of specimen.

3.4.3 Pump Hold

Pump hold allows pumping to continue for a pre-determined time or until a key is pressed. When a key press is detected the cycle will then proceed as normal

```
Pump Holding, Press a key to continue
Time Remaining: 03:05:47

Vacuum   9x10+1 mbar            Turbo Speed  35 %
```

The maximum time that pump hold can be set for is 8 hours.

3.4.4 Bleeding Gas Into Chamber

At this point the process gas valve opens and bleeds argon into the chamber through the needle valve located on the top plate. If necessary, this should be adjusted to give approximately $7x10^{-3}$mbar. The gas bleeds for a time to allow the vacuum to stabilise before the plasma comes on. The factory default for this time is 20 seconds. The coat cycle commences straight after the bleed gas period.

3.4.5 Coating Now

The argon gas continues to bleed in the vacuum may drop slightly. The factory default settings for coating are 150mA for 30 seconds. The display will look like that below.

```
Coating Sample at 375 milliamps
Vac:  7x10-3 mbar    Turbo  100%
Current Time Remaining.
  125       00:28
```

If enabled the stage will rotate while the sample is being coated. If the FTM option fitted and is enabled the current sample deposition will be displayed, there is a maximum time limit allowed for the desired deposition to be reached. If the deposition is not reached in this allowed time an error will be shown at the end of the cycle.

3.4.6 Coating Finished, completing the cycle.

When coating time period has finished plasma, the process gas, and the turbo pump will switch off and, if fitted the peltier head cooling will also switch off. After a 10 seconds delay which allows for the turbo to run down slightly, the rotary pump switches off, then the purge valve will pulse on and off to help the turbo pump to slow down before opening fully to vent the chamber, approximately 5 seconds later. This pulsing is at 20% duty cycle.

NOTE: Sputtering rates will vary for different applications and changes in vacuum and target condition. Typically the rate at 125mA is 15 nm per minute and this can be used to give estimates of thickness. See also Deposition Chart Section 7.5.

3.5 Front Panel Controls

These are the controls by which the instrument is operated. Refer to Appendix **Error! Reference source not found.**

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.

3.6 Setting Operating Parameters

There are a number of user programmable options that can be altered by the front panel keys. These are as the following table. Note the variables in italics are only applicable to the internal film thickness module if one has been factory fitted.

Parameter	Allowable Values	Description
Coating Current	0 - 100 mA in 5 mA Steps	Plasma Current, default value 75mA
Coating Time	0 - 4 Minutes in one second steps	Time for the coating, default 2 Minutes
FTM enabled	Yes / No	This value determines whether the software monitors the STOP signal from the FTM. If it is enabled and there is no FTM connected the coating will stop immediately.
FTM Type	Internal/External	If an Film Thickness Monitor is fitted this tell the software which type to monitor
FTM Mode	Manual Automatic	Manual monitors coating thickness for the full coating time period automatic teminates coating at a pre determined thickness
Material Density		This is the density of the coating material being used. It's value is units of g cm^3.
FTM Terminate	0- 999.9 nm	This is the deposition thickness which when exceeded will cause the FTM to assert the coater STOP signal, if and only if the FTM is in AUTO, mode
FTM Tool Factor	0-	This is a factory set variable that is used to account for the difference in positions from the target between the crystal and the sample, It can be adjusted by the same method as for the terminate values.
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
Stage Rotate Enabled	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.

4. SPUTTERING PROTOCOLS

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

The **K650XT** is primarily to provide conductive metal coatings for SEM microscopy. In such applications it would be common to use Aluminium Specimen Stubs. 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 achieved, it may be advantageous to use adhesives which are electrically conductive. Silver Dag, a Silver Loaded Conductive Paint is commonly used, but 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 tape can be used. In both cases the mounting medium is of low profile. The coating should be sufficient to make electrical contact with the specimen and stub. If this is not the case, it may be necessary to bond using one of the previously mentioned conducting adhesives.

While the standard settings for Sputter Coating, mentioned in Section 3. Operation, may be satisfactory for most SEM applications (giving typically 15nm (150 Angstroms) settings: 75mA. 45mm. 2mins), these can be optimised depending on the specimen. The objective being to obtain as thin and continuous conductive coating as possible to avoid obstructing detail, while giving specimen stability and avoiding charging.

For very irregular specimens a slightly thicker coating may be required if charging is observed. While various settings such as time and spacing can be altered, we would recommend increasing the coating time, while maintaining the sputtering current and distances. (Giving typically 21nm (210 Angstroms) settings: 20mA. 45mm. 3mins.)

For less irregular specimens and thinner coatings for fine detail, where charging does not appear as significant, then reducing the sputtering current would be the preferred method. (Giving typically 10nm (100 Angstroms) settings: 15mA. 45mm. 2 minutes.)

The heat input from sputtering with the **K650XT** is very small. If it is considered the specimen is heat sensitive, then a low sputtering current, with longer time to achieve the necessary coating thickness is recommended, while maintaining maximum specimen spacing. It is not considered necessary, with the low thermal input and low sputtering voltage, to pre-cool the specimen stage. Assuming the specimen is stable at room temperature.

The low sputtering voltage is to achieve low thermal input, and high resolution, small grain size coatings. Typically the grain size of Gold is of the order of 2nm (20 Angstroms). However, as we normally require somewhat thicker coatings to achieve electrical conductivity the final resolution will be somewhat less.

Alternative target materials may suggest smaller grain size, Gold/Palladium is the order of 1.7nm (17 Angstroms), there may not necessarily be a recognisable gain in high resolution, and such coatings may be susceptible to cracking. Careful consideration should be given when using alternative material, Gold having proved particularly successful for the majority of SEM work when utilised in Instruments such as the K650XT.

5. **Service and Maintenance**

5.1 Maintenance

Procedure	**Weekly/Monthly**
Clean the glass chamber and the 'L' gaskets as required using velin tissue and foam cleanser (See Section 6), or similar. **Do not use vacuum grease on 'L' gaskets.**	Monthly
Check vacuum pump oil level. Change oil every 6 months using 1 litre of Supergrade 'A'. (See Section 6).	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
Check the condition of the target material. The wear will depend on use. This is mainly over an outer annulus, accounting for some 70% of the surface area. When the backing plate shows at the edges, it may still be used. When this becomes excessive and sputtering is affected, the target should be replaced	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: A replacement target exchange service is offered for precious metal recovery. On return of your original target backing plate, a discount made against your new purchase.

5.2 To Change the Target.

Firstly disconnect the instrument from the mains and remove the power cord. Now loosen the two small Allen screws around the circumference of the target holder using the Allen key provided with your spares kit. These locate into a 'V' groove in the target circumference, the target can then be removed. Replace with the new target, ensuring that the screws are tightened equally and firmly into the 'V' groove to ensure good electrical and mechanical connection.

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.

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South Stour Avenue,
Ashford,
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Tel: +44 1233 646332
Fax: +44 1233 640744

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

5.2 Troubleshooting the K650XT

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 Allen screws to target and connections.

Check correct conditions for sputtering have been set. (i.e. vacuum and gas pressure)

Check all connections.

Check that the L.C.D. 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 K650XT Sputter Coater	Catalogue Number	Quantity
Glass Cylinder 9"	G6262	Each
'L' Gaskets to suit	G6263	Pair
Oil Mist Filter	O7803	Each
Supergrade 'A' Rotary Pump Oil	O7802	1 Litre
Targets - 60mm. Dia x 0.1mm Thick Bonded to target holder. Ex-stock delivery**		
Gold Target	TK8842	x3
Gold/Palladium (80/20%) Target	TK8843	x3
Platinum Target	T8844	x3

** For special Targets please enquire.

Useful Accessories For K650XT Sputter Coater	Catalogue Number	Quantity
Amberclens Foam Cleanser	C5427	Each
Conductive Paint	A5001	3g. Bottle
Silver Loaded Epoxy	A5002	2x15g.
Cyanoacrylate Adhesive Grade C2	A5003	5x5g.
Cyanoacrylate Adhesive Grade C4	A5004	5x5g.
Cyanoacrylate 'Superglue'	A5005	3g. Tube
Double Sided Tape	T8803	20 m. Roll

Useful Accessories for K650XT Sputter Coater.

A comprehensive supply of S.E.M. specimen stubs in machined Aluminium to suit most makes of S.E.M.

Description	Catalogue Number	Quantity
Amray		
½" Dia Pin Stub	S8620	Pack 10
1" Dia Pin Stub	S8621	Pack 10
Cambridge		
½" Dia Pin Stub	S8622	Pack 10
1" Dia Pin Stub	S8623	Pack 10
1¼ Re-entrant Base Stub	S8624	Pack 10
1¼ Dia x $^{3}/_{8}$" High Stub	S8625	Pack 10
Camscan		
½" Dia Pin Stub	S8622	Pack 10
1½" Dia Pin Stub	S8626	Pack 10
Etec		
½" Dia pin stub	S8622	Pack 10
Hitachi		
15mm Dia x 6mm Stub	S8627	Pack 10
25mm Dia x 6mm Stub	S8628	Pack 10
32mm Dia x 10mm Stub	S8629	Pack 10
I.S.I.		
15mm Dia x 10mm Stub	S8631	Pack 10
15mm Dia x 15mm Stub	S8632	Pack 10
Jeol		
10mm Dia x 5mm Stub	S8633	Pack 10
10mm Dia x 10mm Stub	S8634	Pack 10
15mm Dia x 10mm Stub	S8631	Pack 10
15mm Dia x 15mm Stub	S8632	Pack 10
12.5mm Dia x 10mm Stub	S8635	Pack 10
12.5mm Dia x 5mm Stub	S8636	Pack 10
Philips		
½" Dia Pin Stub	S8622	Pack 10
1" Dia Pin Stub	S8623	Pack 10

7. Appendices

7.1 Front Panel Drawing

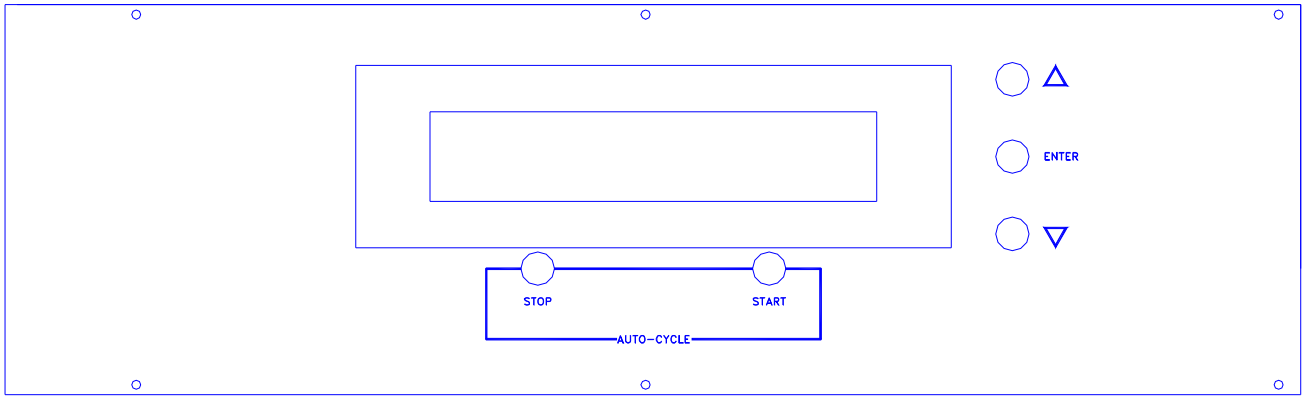

Figure 1

K575X Front Panel Diagram

Diagram applicable to K575x and K650XT

7.2 Rear Panel Drawing

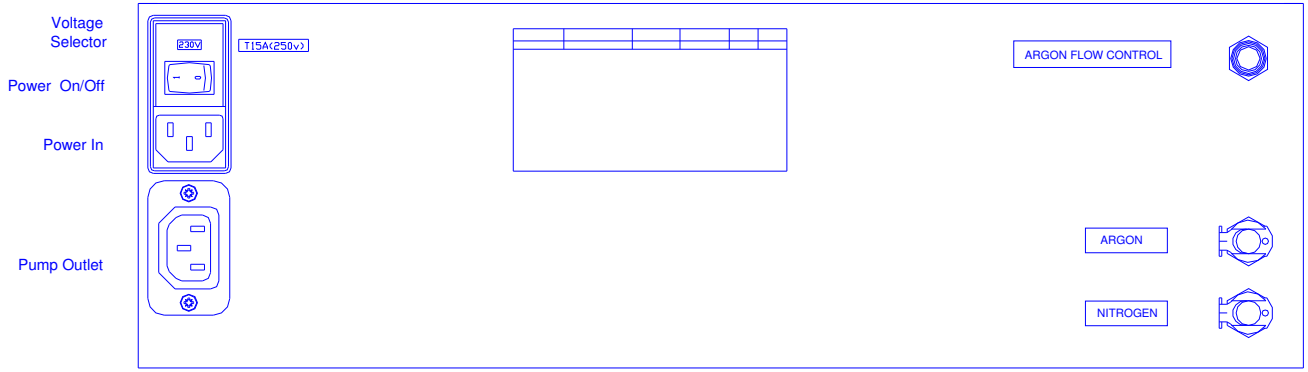

Figure 2

K575X Rear Panel Diagram

Diagram applicable to K575x and K650XT

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 5A Ceramic**	**H.T. Power supply fuse. Located in fuseholder on rear panel**

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 8A Ceramic**	**H.T. Power supply fuse. Located in fuseholder on rear panel**

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

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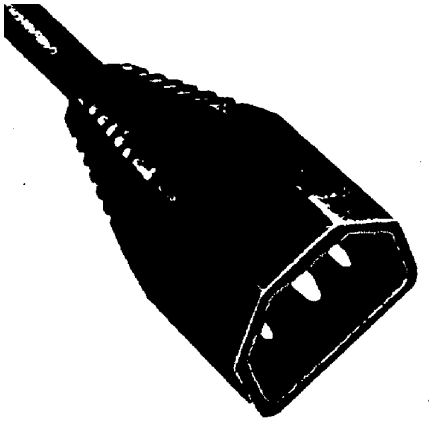
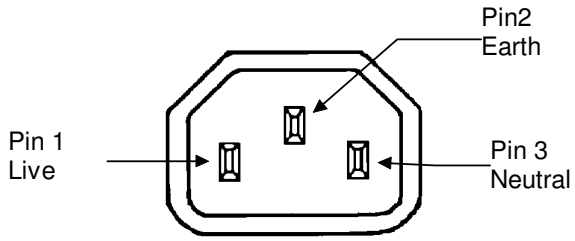
** If an approved distributor is not known - please contact Emitech direct for details.

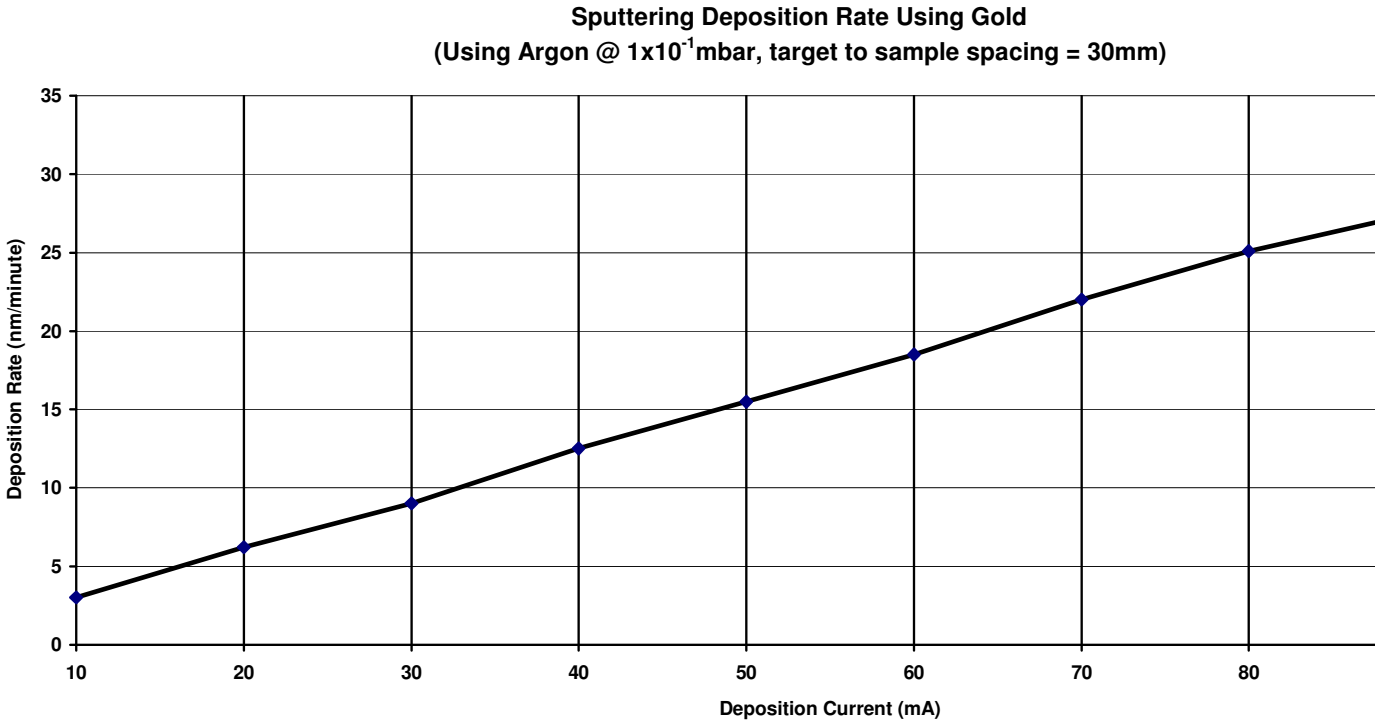
7.4 Pump Plug wiring





	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 Sputtering Rate



7.6 K150X FTM Option

The **K650XT** can be used with an external 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.
The FTM can be used in two modes, AUTO or MANUAL. In manual mode the coating runs for the pre-selected time and the FTM is enabled so that it can count the deposition and disabled at the end of the coating process.
In Auto mode the required deposition is selected on the FTM and a control signal is asserted to inform the **K650XT** that AUTO mode has been selected. When the required amount has been deposited, a control line from the K150x to the **K650XT** will be asserted which tells the coater to stop. The coating time is loaded with a value which acts as a time-out in the event of a fault with the FTM and no coating taking place.
By default the “FTM enabled” option is set to NO in the menu. If using an FTM set this option to YES. Connect the control lead to the 5 pin DIN socket at the rear of the **K650XT** and the BNC lead to the BNC socket at the rear of the **K650XT**.

For further information see the K150X manual.

7.7 World wide Electrical Supplies

Country	Voltages	Frequency
Australia	240V	50Hz
Brazil	115V / 230V	50Hz
Canada	115V	60Hz
Finland	230V	50Hz
France	230V	50Hz
Germany	230V	50Hz
India	230V	50Hz
Ireland	230V	50Hz
Israel	230V	50Hz
Italy	230V	50Hz
Korea (South)	230V	50Hz
Japan	115V	50 / 60Hz
Netherlands	230V	50Hz
Norway	230V	50Hz
Pakistan	230V	50Hz
Portugal	230V	50Hz
Scandinavia	230V	50Hz
Singapore	230V	50Hz
Spain	230V	50Hz
Taiwan	115V	60Hz
Turkey	230V	50Hz
United Kingdom	230V	50Hz
United States of America	115V	60Hz

8. References

1. CRAIG, S. and HARDING G.L. (1981)

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2. ECHLIN, P. BROERS, A.N. and GEE, W. (1980)

Improved resolution of sputter-coated metal films.

Scanning Elect. Microsc. 1980; I,163-170

3. PETERS, K-R. (1980).

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4. SCHILLER, S. HEISIG, U. and GOEDICKE, (1977).

Use of the ring gap plasmatron for high rate sputtering

Thin Solid Films, 40, 327-334

5. THORNTON, J.A. (1978).

Substrate heating in cylindrical magnetron sputtering sources.

Thin Solid Films, 54, 23-31

6. NOCKOLDS, C.E. MORAN, K. DOBSON, E. and PHILLIPS A.

Design and operation of a high efficiency magnetron Sputter Coater.

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(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's 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,
Quorum 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 which 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	04/04/02	Initial Issue for new instrument	PRM