



## THIN FILM DEPOSITION SYSTEMS

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## CRYOFOX TORNADO COMPACT LAB

The Tornado models are range of compact lab workhorses, and due to the easy access, easy operation, and the high process repeatability, it is a preferred tool for both the young student, and the very experienced scientist. Available as HV or UHV model.



- Material research and science
- MEMS and nano activities



## THIN FILM DEPOSITION SYSTEMS

Polyteknik AS is an experienced supplier of high tech equipment for PVD and PECVD thin film deposition and specialises in production and development of advanced deposition solutions.

The systems are usually delivered to high tech institutes and companies, typically within the business and acitivity fields of:

- MEMS fabrication
- Sensor fabrication
- TEM Thermo Electric Modules
- Battery and storage activities
- Solar PV R/D acitivities
- Solar CSP R/D and fabrication
- Piezo sensors and actuators
- Roll-to-Roll r/d and production
- Special applications

Our deposition systems are based on high quality standard platforms and the easy-to-use Cryosoft3 software for higly advanced processing and datalogging. The advanced processes are typically developed in close cooperation with our customers. Polyteknik is a trusted supplier of depostion technology and we are proudly announcing that we have an almost global reference list.

## CRYOFOX DISCOVERY

Deposition systems for R/D work, process development, and the initial small scale production phase. Engineered and manufactured for depostion of high quality thin films. Available with full automatic sample loading from frame- or SMIF-cassette.



- Research and PV prototyping
- University research and science
- Versatile and generic



## CRYOFOX CLUSTER UHV

### CRYOFOX EXPLORER

The Explorer systems with a split chamber configuration is a favourite choice in the Scandinavian universities. A long list of reference articles of research work performed on these systems is speaking for itself.



- Very generic configuration
- Versatile source configuration



The Cryofox UHV Cluster System is a family of compact cluster tools, specific developed for PVD and PECVD processes in UHV environment. The systems are optimized in the mechanical design and control system for highest output of top quality research samples and process data. Major application fields are:

- Thin Film Solar
- OLED structures
- HB-LED
- Fuel Cell Battery

### PROCESS SOFTWARE



Unique CryoSoft3, advanced & simple-to-use 'recipe driven' process control software. Available for new and as an upgrade on older deposition systems.

- Control of e-Beam, thermal evaporation & magnetron sputtering deposition
- Data logging of all process parameters
- Automatic control from loaded deposition recipes
- Multi-user password protected
- Integration of advanced dynamic process analysis

### ROLL-TO-ROLL SYSTEMS

The roll-to-roll systems can be offered from our modular Infinity series, or be offered as bespoke systems. A various range of flexible substrates can be processed by PVD and PECVD processes.



## Cryofox Tornado 306

### E-beam evaporation with substrate heating

The Cryofox Tornado 306 is a compact e-beam evaporation system, capable of handling substrates of 200mm in diameter. As standard it is equipped with a 3 kW E-beam evaporation source with 4 x 4 ccm or 6 x 2 ccm crucibles (pockets).

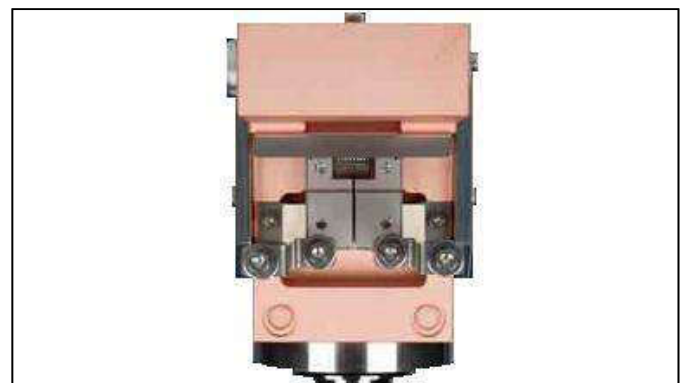
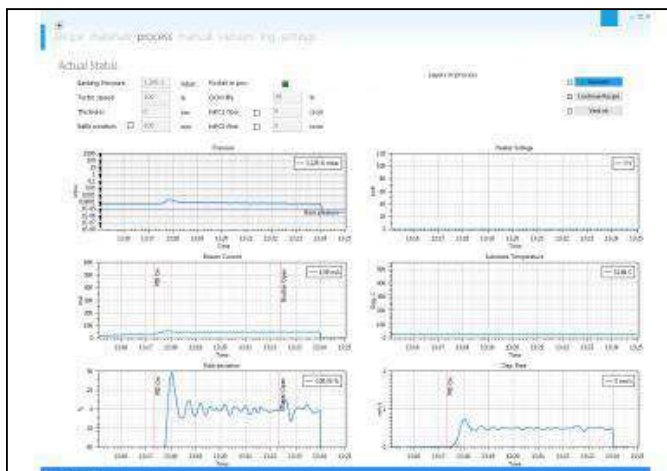
The system is really a lab workhorse, and due to the easy access, easy operation, and the high process repeatability, it is a preferred tool for both the young student, and the very experienced scientist.

Typical applications are:

- Metal coatings for electrodes
- Lift-off deposition for MEMS applications
- Metals and oxides

The E-beam evaporation source can have individual sweep programmes attached to the individual material pockets in the recipe. Equipped with the Cryofox3 software, an easy-to use recipe system, a very high repetition accuracy is obtained for this compact e-beam system.

As for all our Tornado models, this system is equipped with the high quality turbo molecular pumps and a dry roughing pump from Edwards Vacuum. This is ensuring a high up time and low cost operation of the Tornado 306 and 405 models.



## TECHNICAL SPECIFICATIONS

Main dimensions	1240 x 1250 x 1600 mm W x H x D
Vacuum chamber	300 x 600 x 350 mm, W x H x D, App. 60 liter
Vacuum pumps	Edwards nEXT 400, 400 l/s, Edwards XDS 35 m <sup>3</sup> /h dry pump
E-beam power supply & source	Max 3 kW, 6 -10 kV, 4 x 4 ccm or 6 x 2 ccm crucibles
Electric supply	3 x 400 V, 5 kVA peak
Cooling water supply	18-25 C, max 3 kW cooling capacity peak

## Tornado 405 TE

### Thermal Evaporation

The Cryofox Tornado 405 Thermal evaporator is a compact evaporation system with substrate holder of maximum diameter of Ø300 mm. It is equipped with 5 evaporation sources, automatic source selection switch, and quartz thickness gauge for automatic rate control and film thickness control.

The system is a really lab workhorse, and due to the easy access, easy operation, and the high process repeatability, it is a preferred tool for both the young student, and the experienced scientist. This system is good alternative to the Tornado 306 E-beam version, if the budget is a bit more limited.

Typical applications are:

- Metal coatings for electrodes
- Lift-off deposition for MEMS applications
- Metals and oxides
- Sample preparation

As for all our Tornado models, this system is equipped with the high quality turbo molecular pumps and a dry roughing pump from Edwards Vacuum. The TMP has a long-life hybrid bearing configuration. This is ensuring a high up time and low cost operation of the Tornado 306 and 405 models.



## TECHNICAL SPECIFICATIONS

Main dimensions	1240 x 1250 x 1500 mm W x H x D
Vacuum chamber	400 x 500 x 485 mm, W x H x D, App. 96 liter
Rotating tool plate	Ø 300 mm substrate holder
Vacuum pumps	Turbo molecular pump and dry roughing pump
Thermal evaporators	5 pcs of evap. 5 pcs selections swithc, 3 pcs of automatic shutters
Thickness measurement	Quarts crystal, for automatic deposition
Plasma cleaning	Source and 1400 V, 50 Hz supply
Electric supply	3 x 400 V, 2,5 kVa peak
Cooling water supply	18-25 C, max 1 kW cooling capacity peak

## TORNADO 405 Sputtering Tilt-Head substrate holder

The Cryofox Tornado 405 is a compact sputtering system with water cooled tilt-head substrate holder for 100 mm (4") substrates. As standard it is equipped with two pcs of 3" tilt magnetrons for single or co-deposition by RF reactive sputtering, a AC-plasma source, and dry vacuum pumps.

The system is a really lab workhorse, and due to the easy access, easy operation, and the high process repeatability, it is a preferred tool for both the young student, and the very experienced scientist.

Typical applications are:

- Oxide and nitride coatings
- Graded cermet layers
- Metal coatings for electrodes
- Hydrophobic or hydrophilic ceramic layers
- Metal electrodes for PV solar samples



The magnetrons can be configured with balanced or unbalanced magnet setup, and are very easy reconfigurable.

It has the latest generation of the advanced Cryosoft3 control software, including the superior recipe system and data logging functions.

As for all our Tornado models, this system is equipped with the high quality turbo molecular pumps and a dry roughing pump from Edwards Vacuum. The TMP has a long-life hybrid bearing configuration. This is ensuring a high up time and low cost operation of the Tornado 306 and 405 models.





## TECHNICAL SPECIFICATIONS

Main dimensions	1240 x 1250 x 1500 mm W x H x D
Vacuum chamber	400 x 500 x 485 mm, W x H x D, App. 96 liter
Rotating tool plate	Ø 100 mm substrate holder with tilt, holder for small samples incl.
Roughing pump	35 m <sup>3</sup> /h dry pump
High vacuum pump	Turbo molecular pump 400 l/s, hybrid bearings
Magnetron / RF-power supply	2 pcs of 3
Plasma cleaning	Source and 1400 V, 50 Hz supply
Electric supply	3 x 400 V, 1,5 kVa peak
Cooling water supply	18-25 C, max 1 kW cooling capacity peak
Options:	3rd magnetron, DC sputtering supply, Ion gun, ekstra MFC's

## Discovery 304 Sputtering RF-DC Generic standard system

The Cryofox Discovery 304 is a very generic sputtering system for R&D work, process development, and the initial small scale production phase. In the basic configuration, it is equipped with three of 3" magnetrons for DC and RF-sputtering, and can optionally be equipped with up to six magnetrons.

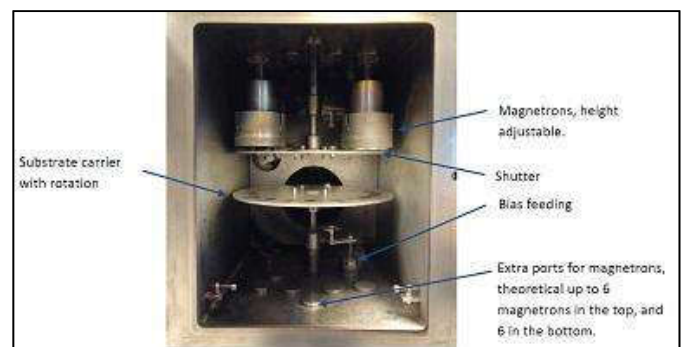
The chamber is prepared for "bottom-up" and/or "top-down" mounting of the magnetrons.

The substrate carrier of Ø 300 mm with variable speed, is electrically isolated and prepared for sputter-etch and biasing of the substrates.

Though being a smaller system it has the latest version of the Cryosoft-3 recipe based software system with full process control and data logging.

Application areas include:

- ....
- MEMS
- Metal coating for electrodes
- Oxide or Nitride coatings
- General R&D depositions



## TECHNICAL SPECIFICATIONS

System weight	App. 750kg
Vacuum chamber	300 x 400 x 350 mm, W x H x D, App. 40 liter
Vacuum system	Turbo molecular pump and dry roughing pump
Base pressure	1E-6 mbar range
Electric supply	3 x 400 V, 3 kVA peak
Cooling water supply	18-25 C, max 3 kW cooling capacity peak
Cooling water flow	8 l/min in standard configuration

## Discovery 409 e-beam

### High precision thin films with superb uniformity

The Cryofox Discovery 409 EB Thin Film Deposition System is a workhorse in the advanced research lab and high tech production facilities with low to medium volumes.

The design is classic with the e-beam source placed in the chamber bottom and the substrate holder mounted in the top, but in combination with the advanced Cryosoft-3 control software, high precision results are generated with high repetition accuracy.



As standard deliverable with various E-beam solutions ranging from 4-10 kW, variable crucible system and size.

The Cryosoft-3 software has included the advanced E-beam deposition package, where individual beam sweep patterns and individual soak power ramps are linked to the individual material crucibles. Basic material process data is included in the material database.

Typical applications are:

- MEMS
- SAW-devices
- Data storage
- General R&D depositions



## TECHNICAL SPECIFICATIONS

System dimension (foot-print)	1400 x 1850 x 1250 mm (W x H x D)
System weight	App. 800 kg.
Vacuum chamber	420 x 875 x 525mm, W x H x D, App. 175 liter
Vacuum system (standard)	Turbo molecular pump and dry roughing pump
Vacuum system (optional)	Cryo pump
Base pressure	1E-7 mbar range
Electric supply	3 x 400 V, 5 kVA peak
Cooling water supply	18-25 C, max 3 kW cooling capacity peak
Cooling water flow	12 ltr/min, 5 bar max pressure difference

## Discovery 409 E-beam 6 kW Including advanced substrate heating system

The Cryofox Discovery 409 is a deposition system engineered and manufactured for deposition of high quality thin films.

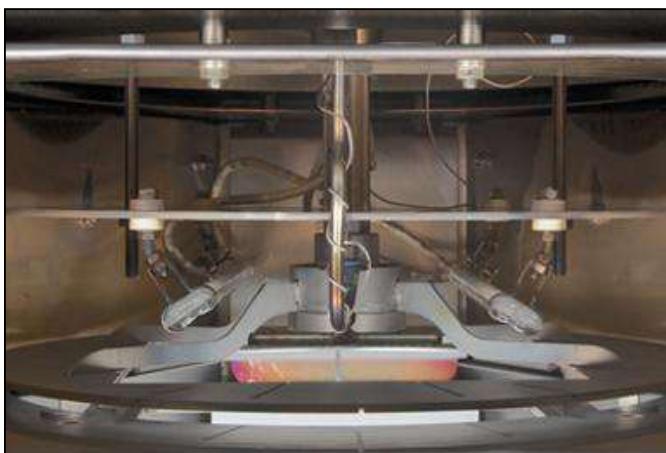
The electron beam source is placed in the bottom of the process chamber while the heated substrate fixture is mounted in top allowing for rotational movement around the vertical z-axis.

The precision heating system based on Quarz heaters, is placed above the substrate holder, and has a working range from 50 - 500 °C of substrate temperature.

As special feature, this system has a double shutter system which is avoiding even very small pre-deposition of evaporation material during the e-beam heating of evaporation material in the crucible. For instance silver (Ag) is extremely mobile in evaporated mode, and special precautions has to be taken to avoid previous low rate deposition, before the main deposition process is initiated.

This system is equipped with a dry vacuum pumping system, including a powerfull TMB high vacuum pump with a pumping capacity of 3300 l/s, and a dry roughing pump with a capacity of 35 m3/h.

It has the newest Cryosoft3 recipe based control system including the precision heater software module, which in total is an advanced process generator and process performer.





## TECHNICAL SPECIFICATIONS

System dimension (foot-print)	1402 x 1835 x 1433 mm (W x H x D)
System weight	App 800 kg
Vacuum chamber	420 x 875 X 530 mm, W x H x D, App. 175 liter
Vacuum system (standard)	Turbo molecular pump and dry roughing pump
Vacuum system (optional)	Cryo pump and dry roughing pump
Base pressure	1E-7 mbar range
Electric supply	3 x 400 V, 5 kVA peak
Cooling water supply	18-25 °C, max 3 kW cooling capacity peak
Cooling water flow	15 ltr/min, 5 bar max pressure difference

## Discovery 507 Thermal

### Thermal evaporator + Substrate heating

The Cryofox Discovery 507 Thermal is a compact evaporation system with substrate holder of maximum diameter of Ø 480mm. The substrate holder is available with both heater and automatic tilt options. It is equipped with 2 evaporation sources, automatic source selection switch, and quartz thickness gauge for automatic rate control and film thickness control.

In the basic standard configuration the system offers easy access, easy operation, and high process repeatability with our Cryosoft-3 software. The system is equipped with the high quality turbo molecular pumps and a dry roughing pump from Edwards Vacuum. The TMP has a long-life hybrid bearing configuration. This is ensuring a high up time and low cost of operation and maintainance

Typical applications are:

- Metal coatings for electrodes
- Lift-off depostion for MEMS applications
- Metals and oxides
- Sample preparation





## TECHNICAL SPECIFICATIONS

System dimension (foot-print)	1400 x 1850 x 1250 mm (WxHxD)
System weight	750 approx. kg.
Vacuum chamber	500 x 700 x 500 mm, W x H x D, App. 175 liter
Vacuum system (standard)	Turbo molecular pump and dry roughing pump
Vacuum system (optional)	Cryo pump
Base pressure	low end of E-7 mbar range
Electric supply	3 x 400 V, 5 kVA peak
Cooling water supply	18-25 C, max 3 kW cooling capacity peak
Cooling water flow	8 l/min

## Discovery 507 - E-beam evaporation with ion beam Ion beam assisted e-beam evaporation

The Cryofox Discovery 507 thin film deposition system is a rack model with a small foot print for installation in open space or for building into a cleanroom wall. It is one of our standard deposition systems, but engineered and build to meet your demand. Only well known and tested high end components are used in the system.

The e-beam and ion source are placed on the bottom plate of the process chamber. The substrate carrier head is hanging down from the top plate. The carrier head can handle up to a 6" wafer. The carrier head can rotate during deposition and tilt. The tilt function is manually and can be controlled up to 60 deg.

The deposition chamber has a front door with sight glasses. Inside will easy exchangeable liners protect the chamber walls from deposition material from the e-beam. The e-beam is assisted during deposition by the integrated ion source.

Typical application areas are:

- MEMS
- Medium to high volume production
- R&D



## TECHNICAL SPECIFICATIONS

System dimension (foot-print)	1400 x 1850 x 1500 mm (W x H x D)
System weight	App. 1000kg
Vacuum chamber	500 x 700 X 550 mm, W x H x D, App. 180 liter
Vacuum system (standard)	Turbo molecular pump and dry roughing pump
Vacuum system (optional)	Cryo pump
Base pressure	1E-7 mbar range
Electric supply	3 x 400 V, 5 kVA peak
Cooling water supply	18-25 C, max 3 kW cooling capacity peak
Cooling water flow	15 ltr/min, 5 bar max pressure difference

## Discovery 605 SP - Single or dual side sputtering

Optimized system for QCM production

The Cryofox Discovery 605 Thin Film Deposition System is a standard deposition system engineered and manufactured to your specifications for QCM production. The system is one compact unit containing both the vacuum/process system and the control system.

The sources are placed in the bottom and top of the process chamber while the substrate fixture is mounted in the door allowing for rotational movement around the vertical z-axis.

Main system features:

- Process chamber has front operated door with large sight glasses.
- Five magnetrons for 3" targets incl. individual shutter control.
- DC & RF sputtering
- Plasma cleaning, including power supply.
- Easy-to-use Cryosoft-3 software with full data logging capability.

This standard sputtering system is optimised for high volume manufacturing of QCMs. The system offers a flexible substrate fixture system and a batch process time of less than one hour.



## TECHNICAL SPECIFICATIONS

System dimension (foot-print)	1400 x 1850 x 1540 mm (W x H x D)
System weight	App. 1450 kg
Vacuum chamber	620 x 500 x 830 mm, W x H x D, App. 250 liter
Vacuum system (standard)	Turbo molecular pump and dry roughing pump
Vacuum system (optional)	Cryo pump
Base pressure	low end 1E-7 mbar range
Electric supply	3 x 400 V, 5 kVA peak
Cooling water supply	18-25 C, max 3 kW cooling capacity peak
Cooling water flow	18 ltr/min, 5 bar max pressure difference

## Discovery 608 EB LL

E-beam deposition system with automatic substrate loading from load lock

The Cryofox Explorer 608 EB LL thin film deposition system is a standard deposition system. The system is one compact unit containing the vacuum/process system, the load lock system and the control/surveillance system.



The E-beam source is placed in the bottom of the process chamber while a heated substrate fixture is mounted above, allowing for rotational movement around the vertical axis. The substrate carrier system can be configured to load either one square substrate with frame, or configured for several wafers per run.

The major applications of the system are:

- MEMS, Metal deposition on wafers loaded from SMIF cassette
- Lift-Off, Deposition on wafers loaded from SMIF cassette
- PV a-Si, E-beam deposition of Si on square substrates (optional laser post treatment)

The system can be equipped with two types of full automatic loading systems:

- LL-F Frame-type loader for loading of substrates and frames (170x170 mm substrates)
- LL-W Loader for loading of wafers from SMIF cassette, max size 8" wafers



## TECHNICAL SPECIFICATIONS

System dimension (foot-print)	2960 x 1860 x 1250 mm (W x H x D) LL-F-version
System weight	App. 1200kg
Vacuum chamber	520 x 775 x 620 mm, W x H x D, App. 240 liter
Vacuum system (standard)	Turbo molecular pump and dry roughing pump
Vacuum system (optional)	Cryo pump and dry roughing pump
Base pressure	1E-7 mbar range
Electric supply	3 x 400 V, 5 kVA peak
Cooling water supply	18-25 C, max 3 kW cooling capacity peak
Cooling water flow	12,5 ltr/min, 5 bar max pressure difference

## Discovery 709 OPTA

The Cryofox Discovery 709 OPTA is a standard deposition system engineered and manufactured for deposition of high quality optical films. The system is one compact unit containing both the vacuum process system and the control system.

The electron beam source and the plasma source are both placed in the bottom of the process chamber while the heated substrate fixture is mounted above allowing for rotational movement around the vertical z-axis.



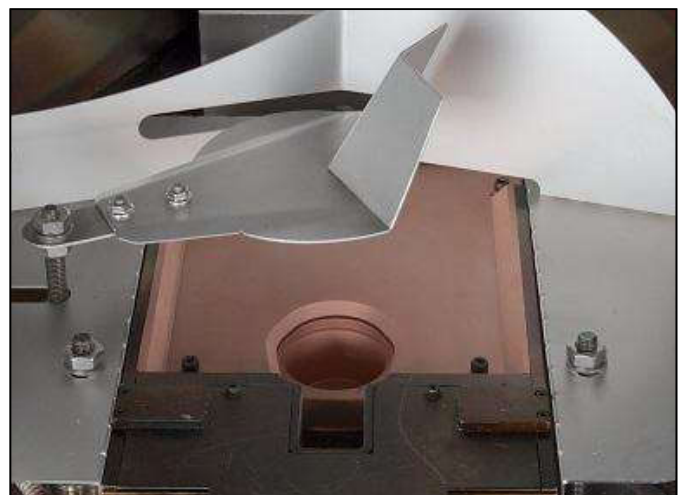
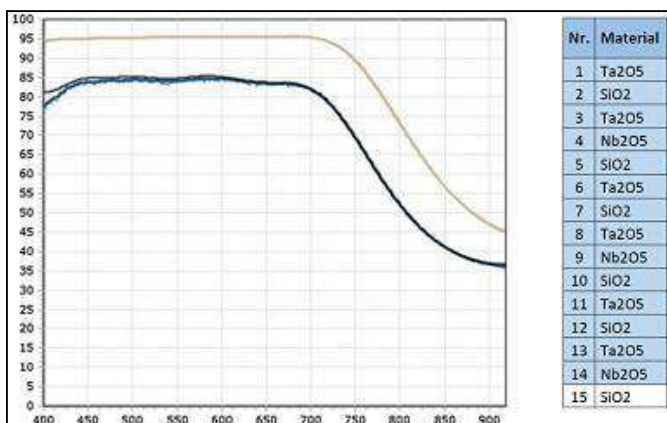
OPC-3 Optical Process Control:

It has the newest Cryosoft3 control system including the OPC3 optical control system.

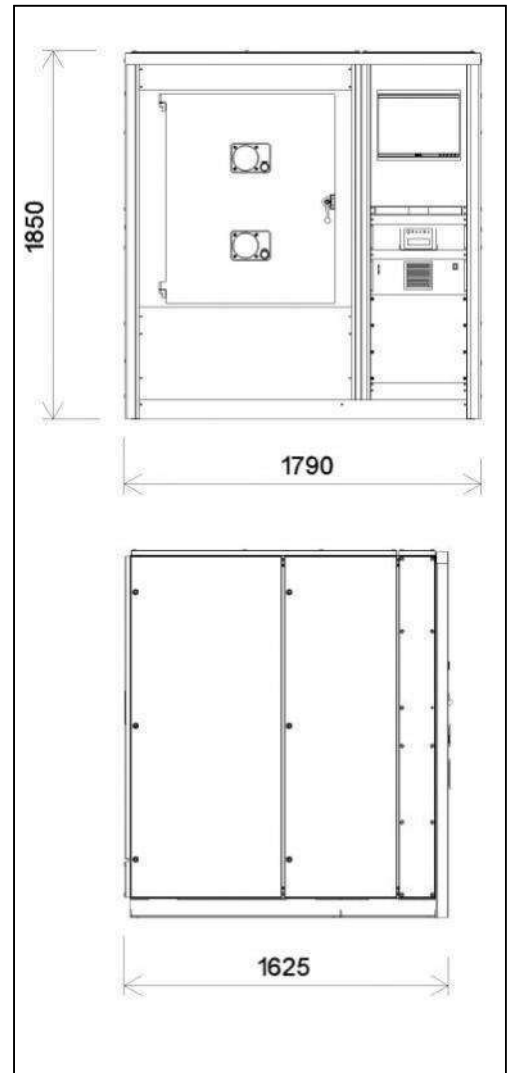
The Cryosoft OPC-3 software with hardware module is in overall controlling the optical performance during deposition from the following key information and system components:

- Master filter spectrum recipe import
- In-situ optical transmission measurement system
- In-situ optical reflection measurement system
- Spectrometer and light sources for 360 – 1690 nm working range

The imported master filter recipe information has included the number of layers, material data, optical properties, and the theoretical filter spectrum data, etc.







## TECHNICAL SPECIFICATIONS

Main dimensions	1790 x 1850x1625 mm WxHxD (exclusive roughing pump)
Vacuum chamber	750 x 950 x 850 mm WxHxD, approx 600 tlr
Rotating tool plate	OD Ø700 mm dome
Roughing pump	Dry type
High vacuum pump	Cryo pump
Electron beam source	6 kW (10 kW)
Ion gun / plasma source	Yes
Electric supply	3 x 400 Volt, 20 kVA peak power
Cooling water supply	20 °C +/- 2C
Cooling capacity	Idle: 6 kW. By deposition 15 kW peak

## Explorer 600 EB SP

### E-beam, RF and DC sputtering sources

The Cryofox Explorer 600 is a very alround combination system equipped with one E-beam source, and two 2" magnetrons, individual powered with a RF and a DC power supply.

It has a split chamber configuration, with water cooled substrate holder placed in the upper chamber (loading chamber), and the evaporaton sources placed in the main chamber underneath.

The systems offers a wealth of opportunities including co-deposition and reactive sputtering processes. Our Cryosoft3 software provides unique control of the depostion process as well as one of the best and most user-friendly interfaces. This maximises the quality of the research results even in a multiple user environment.

The benefits of this PVD-system are:

- High value for money
- Very generic configuration
- Versatile source configuration
- Versatile source configuration
- Long list of reference articles on this system
- A favorite choice in Scandinavian universities
- Cryosoft3 software - fast and advanced process development



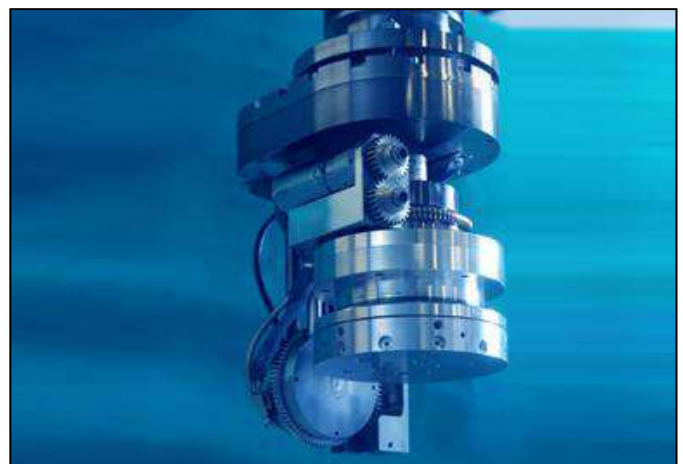
## TECHNICAL SPECIFICATIONS

System dimension (foot-print)	1400 x 1860 x 1250 mm (W x H x D)
System weight	1500 approx. kg
Main chamber, LT version	290 x 785 x 380 mm, W x H x D, App. 87 liter
Main chamber, ST version	290 x 410 x 380 mm, W x H x D, App. 45 liter
Loading chamber	290 x 265 x 580 mm, W x H x D, App. 45 liter
Vacuum system, standard	TMP1: 240 l/s, TMP2: 400l/s, RP: 35 m <sup>3</sup> /h dry pump
Base pressure	1E-7 mbar range
Electric supply	3 x 400 V, 7 kVA peak
Cooling water supply	18-25 C, max 6 kW cooling capacity peak
Cooling water flow	18 ltr/min, 5 bar max pressure difference

## Explorer GLAD 4

### Nanostructures by Glancing Angle Deposition

The Cryofox Explorer GLAD is a double chamber deposition unit equipped with a multi pocket electron beam evaporator and an optional ion gun source. A two axis substrate carrier is able to precisely position the sample during the deposition. In this way, three dimensional ordered arrays of nanostructures of various materials can be deposited. Post oxidation of the individual layers can be done by plasma treatment set up directly in the Cryofox3 software.



## TECHNICAL SPECIFICATIONS

System dimension (foot-print)	1400 x 2450 x 1250 mm (W x H x D)
System weight	1500 approx. kg.
Vacuum chamber, Main	320x 1205 x 485 mm, W x H x D, App. 175 liter
Vacuum chamber, Loading	140x 270 x 200 mm, W x H x D, App. 5 liter
Vacuum system (standard)	TMP: Edwards 1606 maglev + nEXT400, RP: Edwards XDS35
Vacuum system (optional)	Cryo: HSR Velco322 RP: Edwards XDS35
Base pressure	1E-8 mbar range
Electric supply	3 x 400 V, 5 kVA peak
Cooling water supply	18-25 C, max 3 kW cooling capacity peak
Cooling water flow	24 ltr/min, 5 bar max pressure difference

## Cryofox Explorer 700

Combined dual-beam and magnetron sputtering deposition

The Explorer 700 is a generic unit for e-beam evaporation and magnetron sputtering deposition of thin films. The split chamber system layout is based on a long source-to-substrate distance for the e-beam evaporation, while keeping a short distance between magnetrons and substrates. In this setup a large variety of layer combinations can be achieved without breaking the vacuum.



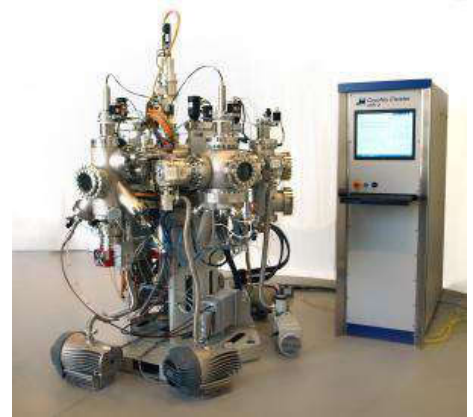
## TECHNICAL SPECIFICATIONS

System dimension (foot-print)	2804 x 2050 x 1560 mm (W x H x D)
System weight	App. 1800 kg
Vacuum chamber, Main	680 x 1115 x 775mm, W x H x D, App. 540 liter
Vacuum chamber, Loading	680 x 225 x 775mm , W x H x D, App. 170 liter
Vacuum system (standard)	Cryo: HSR Velco 400, Edwards XDS35 dry pump
Vacuum system (optional)	Cryo: HSR Velco 500: Edwards XDS35 dry pump
Base pressure	1E-7 mbar range
Electric supply	3 x 400 V, 5 kVA peak
Cooling water supply	18-25 C, max 3 kW cooling capacity peak
Cooling water flow	70 ltr/min, 5 bar max pressure difference

## Cryofox Cluster UHV for PVD and PECVD processes

The Cryofox UHV Cluster System is a family of compact cluster tools, specific developed for PVD and PECVD processes in UHV environment. The systems are optimized in the mechanical design and control system for highest output of top quality research samples and process data. Major application fields are:

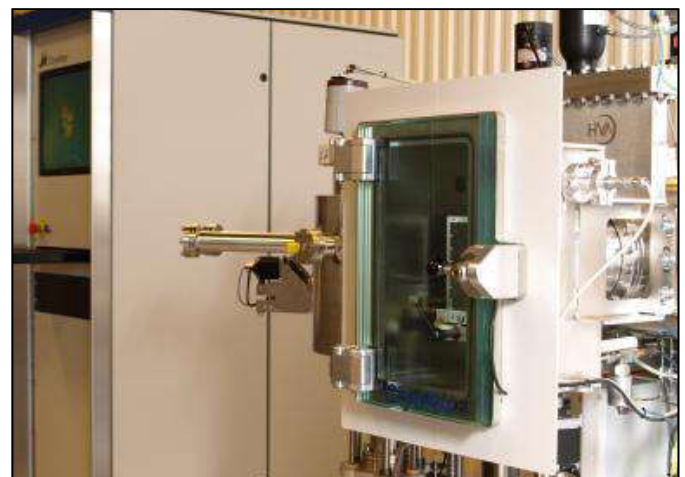
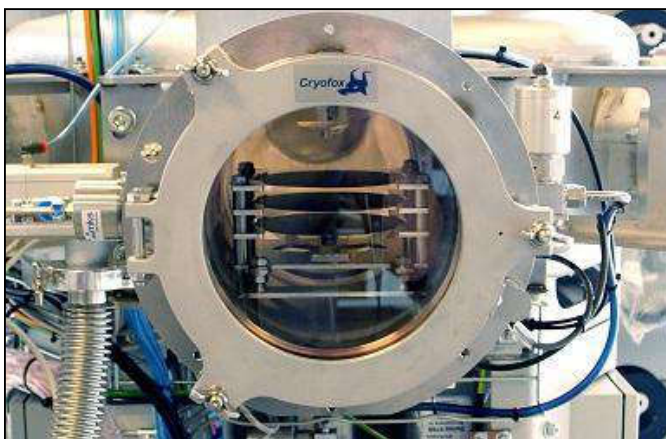
- Thin Film Solar
- OLED structures
- HB-LED
- Fuel Cell Battery



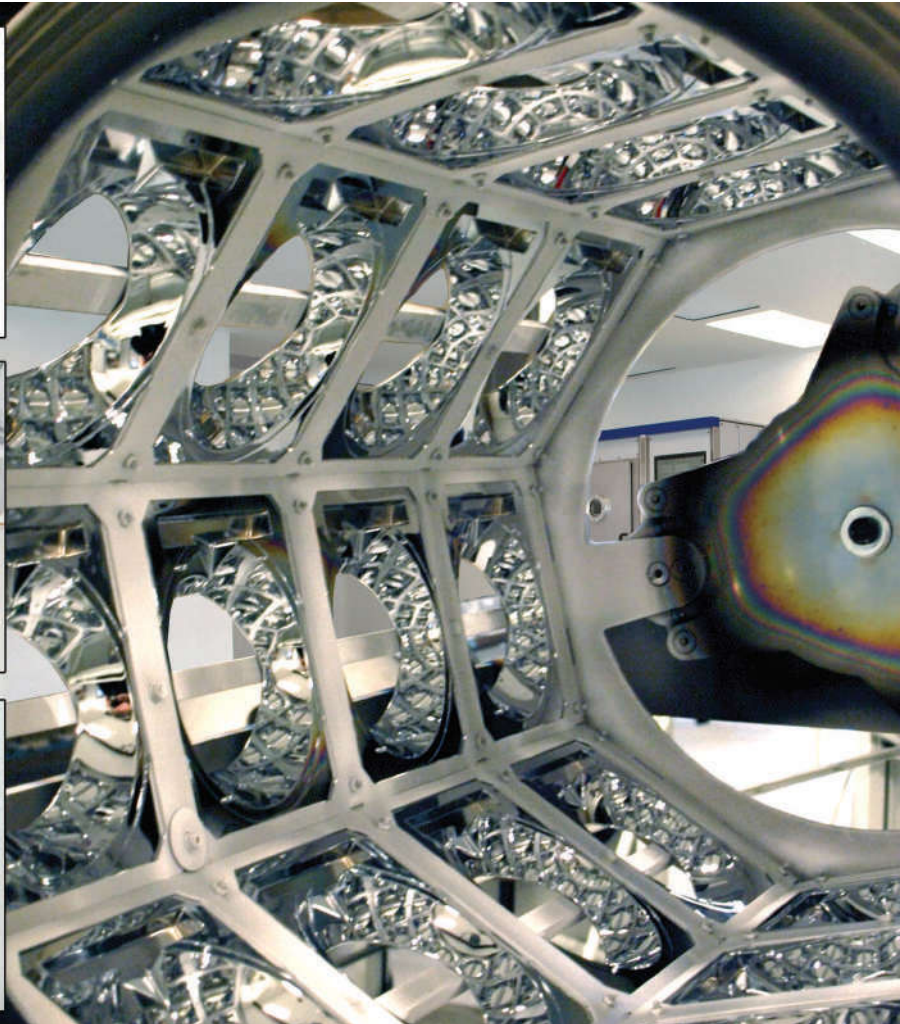
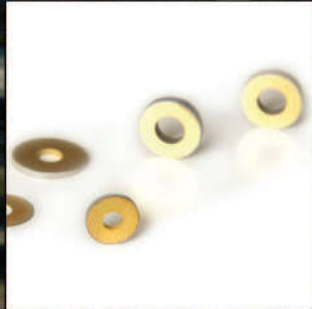
The systems can be configured with chambers for a wide range of process as:

- Sputtering, DC, RF, HIPIMS, Bipolar
- Sputtering, reactive and non-reactive
- Knudsen cells for OLED deposition
- Thermal evaporation sources
- PECVD deposition
- Thermal pre- and post- processing
- Laser post processing

The standard main transfer chamber is equipped with six ports, allowing up to five process chambers and one load lock chamber. The UHV 4 system is designed for circular substrates of Ø100 mm, or square substrates of 100x100 mm.







## SUBCON COATING SERVICE & PROCESS DEVELOPMENT

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## SUBCON COATING DEPOSITION SERVICE & PROCESS DEVELOPMENT

Polyteknik is an experienced and high-quality supplier of thin film deposition services and process development. Since the company was established in Denmark in 1995, we have grown and maintained a loyal customer base from both our domestic and overseas markets. Our in-house advanced thin film deposition plant, comprehensive analysis and characterization lab, class-1000 clean room and committed and highly skilled team, continues to deliver a high-quality service at competitive prices.

We serve a wide range of sectors including:

- EMC shielding
- Electrodes for TEM Thermo Electric Modules
- Electrodes for Battery and storage activities
- Electrodes for Solar PV applications
- Solar CSP R/D and fabrication
- Electrodes for Piezo sensors and actuators
- IR reflective mirrors for optical sensors
- Bespoke applications

## EMI SHIELDING

EMI shielding layers with excellent adhesion and long-term durability, incorporated into housings of various injection-molded plastic compositions. By accurately controlling the layer thickness, the weight of the final product is not affected and popular shielding coating materials include silver, gold, copper, nickel, stainless steel and aluminum.

- Outstanding adhesion and conductivity provides excellent EMI/RFI/ESD shielding
- Repeatability of coating conductivity and thickness
- Thin film coatings will not interfere with product assembly
- More consistent coverage and resistivity than conductive paint or other conventional processes
- Uniform coverage on complex substrates



## CONDUCTIVE ELECTRODES

Some basic building blocks within technologies such as MEMS, for example, is to have a thin film coating on electrodes.

By using precise laser cut masks designed specifically for each individual product, electrodes for electrical connections or post soldering can be deposited on three-dimensional substrates in large volume production scale.

Thin film coating of electrodes can either be transparent or opaque, and electrically conductive coating materials are used such as copper, silver, gold, aluminum, ITO etc.

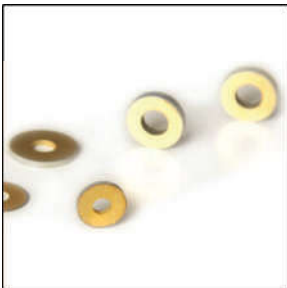
Electrically conductive thin film PVD coatings can be applied to everything from polymers and plastic composites to ceramics.

## PIEZOELECTRIC ELECTRODES

With a thin film metallized electrode coating from Polyteknik, the piezo electrode is consistent and offers a reliable electrical connection.

Polyteknik offers DC/RF sputtering of noble metals and alloys including silver, gold, titanium, nickel, copper/nickel, plus other coatings on all types of piezo material.

Typical piezo electrode patterns include: solid pattern, wrap-around, side tab or insulation band pattern, but we also offer custom designs upon request.



## REFLECTIVE AL COATING FOR HIGH TEMPERATURE OPERATION REFLECTORS

Aluminum high-reflective coating with an advanced protective top ceramic coating, has shown outstanding properties in the stage and architectural lighting equipment industry.

The aluminum layer provides high reflection across the visible spectrum, with the protective top transparent ceramic layer, adding exceptional reflection at elevated temperatures.

- High reflection (+85%) across the visible spectrum
- Continuous operation at 200°C reflector temperature
- Withstands the environmental impact from theatrical fog (i.e. artificial scene-smoke)
- Very good adhesion can be obtained to metallic reflector substrates



## THIN FILM R&D / CUSTOMIZED COATINGS

With a highly skilled team of thin film specialists who can assist with the most demanding development projects, Polyteknik can offer highly specialized coatings on various samples with full material analysis and characterization.

- Thin films for energy storage
- Electrodes for piezo ceramics
- Solar applications
- Electrodes for TEM (Thermal Electric Modules)

Polyteknik's analysis and characterization laboratory offers several techniques including:

- Surface stress / roughness analysis
- Thickness measurements using X-Ray fluorescent, profilometry & ellipsometry
- UV-IR reflection / transmission measurement (FTIR)
- FIB/SEM cross section analysis

## INTERNAL DEPOSITION OF E.G. KICKER CHAMBERS, STAINLESS STEEL TUBES ETC.

Polyteknik's SubCon Coating division specializes in bespoke thin film solutions for a wide range of applications. One particular area of interest is the coating of ceramic kicker chambers used throughout Synchrotron & Linear Accelerators globally. Surrounded by large electro-magnets, the kicker chambers become charged during operation, resulting in a difference in surface resistivity causing irregular oscillations of the beam.

Polyteknik, through a specialized proprietary process under clean room conditions, have developed a method to apply a non-magnetic, highly uniform thin conducting coating to the inner walls of the chambers. This enables a consistent resistance throughout the length of the chamber, therefore eliminating the undesired effects.

- Internal deposition
- Bespoke Thin Film Solutions
- High-Uniformity, Non-Magnetic Coatings
- Guaranteed Surface Resistivity
- Negates 'Charged' Internal Surfaces
- Eliminates Irregular Beam Oscillations
- Custom coatings on request
- Full material characterization

