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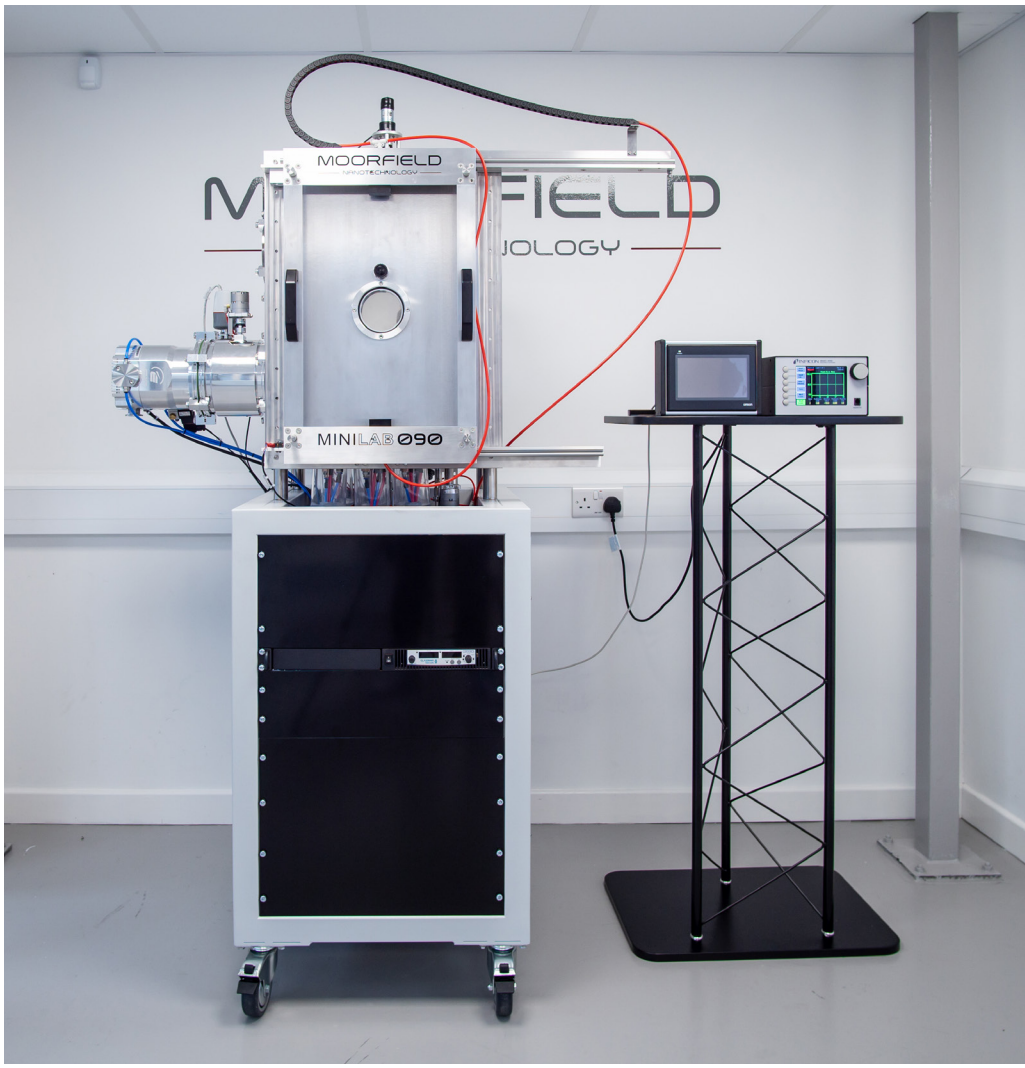
MiniLab 090

Glovebox-compatible physical vapour deposition system



Key features:

- Glovebox-compatible, front-loading box process chamber
- Modular design
- Turbomolecular/cryogenic pumping systems
- Base pressures < 5 × 10^{-7} mbar
- Thermal evaporation
- Low-temperature evaporation (LTE)
- Electron-beam evaporation
- Magnetron sputtering
- Metals, dielectrics and organics deposition
- Up to 11” diameter substrates
- Touchscreen HMI/integrated PC for control
- Easy servicing
- Comprehensive safety features
- Cleanroom compatible
- Proven performance

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PRODUCT INFORMATION

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Overview:

MiniLab systems from Moorfield provide superior coating performance, with the flexibility and modularity of design to address a huge range of customer requirements.

The MiniLab range consists of several platforms. Each platform is generally associated with a specific process chamber size. While all chambers are built to the same standards and allow for high-vacuum operation, larger chambers allow for more techniques and flexibility than their smaller counterparts. In addition to thin-film deposition, MiniLab systems can also be fitted with complementary techniques such as ion beam sources, etching components and annealing stages (platform-dependent).

MiniLab 090 platform:

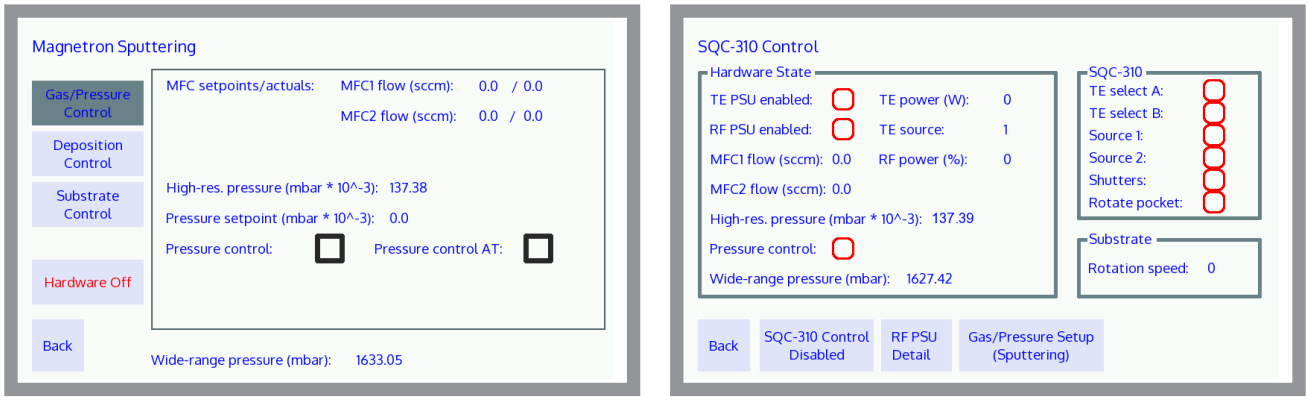
MiniLab 090 systems are floor-standing tools for metal, dielectric and/or organics thin-film deposition. All systems contain a box-type stainless-steel process chamber with front door for loading/unloading. The front door slides open on rails and with assistance from pneumatic locks, for easy in-glovebox operation. Also present is a rear door for service/maintenance access.

The process chamber has a high aspect-ratio, ideal for long working distances for high uniformity coating via evaporative techniques. A turbomolecular pumping system is standard, for high-vacuum base pressures of better than 5×10^{-7} mbar.

Exact configuration is extremely flexible and dependent on customer budgets and applications.

Control system:

The unit is fitted with high-stability, industrial-grade PLC electronics. User operation is via a 7" touchscreen HMI or integrated PC. Powerful but easy-to-use software allows for system setup and operation via a menu-driven interface (note that manual control via electronics rack front panels is also possible, depending on exact system configuration). Data-logging and advanced diagnostics are standard features.



Above: Screenshots from touchscreen HMI software configured for MiniLab 090 control

MiniLab 090 technical specifications:

Chamber
400 mm (width) × 400 mm (depth) × 570 mm (height) stainless-steel front-loading box chamber. Hinged front door for easy access; rear door for service/maintenance. Chamber baseplate, top and sides fitted with ports for in-chamber hardware. Shuttered viewport(s) for process observation. Viton o-ring seals.

Safety interlocks
Water and vacuum levels.

Pumping group
Water-cooled Edwards or Leybold turbomolecular pumps, up to 850 L/s. Edwards rotary or dry scroll-type backing pumps up to 15 m^3/hour.

Pressure measurement
Wide-range gauge (Edwards or Inficon) and optional capacitance manometers for high-resolution measurement.

Substrate stages
Stainless steel, aluminium or copper with threaded holes for substrate attachment. or up to 11" diameter substrates. Optional rotation, heating, cooling, bias and Z-shift modules.

Deposition sources
Various types depending on requirements (see above). Separate brochures available for all Moorfield source types.

Power supplies
Various types depending on integrated techniques. All power supplies fully integrated within system electronics rack.

System control
Industrial-grade, high-stability PLC electronics core. Designed for safe operation and reliable vacuum integrity.

Deposition monitoring and control
Various components including the Inficon SQM-160 (2-channel monitor) and Inficon SQC-310 (process controller).

Weight
Approximately 100–200 kg; dependent on configuration.

Size
1700 mm (height) × 590 mm (depth) × 590 mm (width), excluding backing pump—flexible location; dependent on configuration.

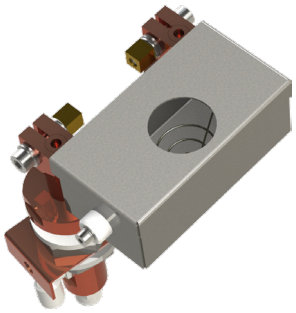
PRODUCT INFORMATION

Moorfield Nanotechnology Limited. Unit 1, Wolfe Close, Parkgate Industrial Estate, Knutsford, Cheshire, UK, WA16 8XJ.
Registered in England and Wales with company number 3044718.

Configuration and options:

The MiniLab 090 base configuration includes a turbomolecular pump positioned on an ISO160 port at one side of the process chamber. The process chamber sits on a frame that contains all system control electronics and power supplies. MiniLab 090 systems are available with load-locks.

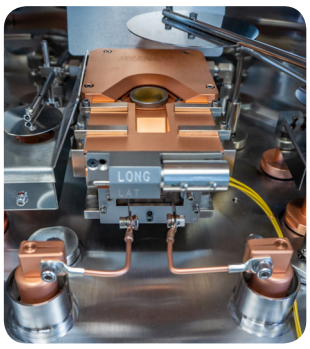
The system can be equipped with a wide variety of deposition techniques. These include thermal and low-temperature evaporation sources (for metals and organics), magnetron sputtering sources (for metals and inorganics) and electron-beam sources (for most material classes except organics). Deposition sources are typically mounted on the chamber baseplate, but sputter-down configurations are also available. Substrate stages, usually at the top of the chamber, can accommodate substrate sizes up to 11" diameter. Substrate heating, rotation, bias and Z-shift are available, together with source and substrate shutters. Examples of configurations for specific applications are listed below.



Moorfield TE1 source for standard thermal evaporation

Moorfield LTE-1CC source for low-temperature evaporation

Moorfield Flexi-Head MAGNETRON source for magnetron sputtering



Telemark multi-pocket water-cooled electron-beam source

Thermal evaporation
Up to 4 thermal evaporation sources. Moorfield TE1, TE2, TE3 or TE4 configurations available. Water-cooled power feedthroughs and boxed shielding for excellent vacuum maintenance and low contamination. Power supplies available for automatic, manual, sequential- and co-deposition.

Low-temperature evaporation
Up to 4 organics sources. Moorfield LTE-1CC, LTE-2CC and LTE-5CC models available. Alumina or quartz crucibles. Power supplies equipped for temperature and power control, in automatic and manual modes.

Magnetron sputtering
Up to four Moorfield MAGNETRON sources for 2", 3" or 4" industry-standard targets (easy fitting/removal). RF, DC or pulsed DC power supplies, fully integrated with system touchscreen controller. Various gas and pressure control packages, including MFCs for process gas introduction. Throttle valve for protecting pumping system from gas loads.

Electron-beam evaporation
Telemark multi-pocket (e.g., 6 × 7 CC or 8 × 4 CC) electron-beam evaporation sources. Sources are water-cooled and can be connected to automated pocket indexer modules. Ferrotec 3 kW, 5 kW and 10 kW power supplies available.

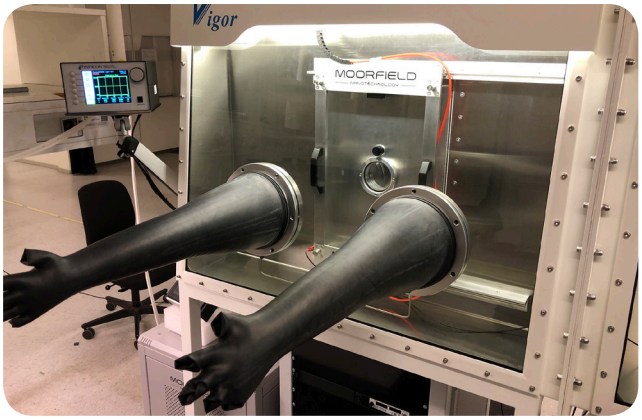
Multi-technique systems:
Various combinations of all of the above can be included in MiniLab 090 systems. For all techniques, deposition rate monitoring (via quartz crystal sensor heads) together with thin-film monitors and controllers are available.

Glovebox compatibility:

The MiniLab 090 is compatible with gloveboxes from most manufacturers. For integration, a suitable cutout is made in the glovebox rear wall for accepting the front face of the chamber.

A hermetic seal is created. The chamber front door is fitted with easy-to-use, ergonomic handles for straightforward operation through gloveports. The door is opened and closed along bearing rails and with assistance from pneumatic actuators.

A microswitch ensures the chamber is fully closed before pumping routines are initiated. The system control interface is fitted to the glovebox frame. We can also supply complete glovebox-deposition packages; please contact us for details.



A modular MiniLab 090 system for before integration into a glovebox

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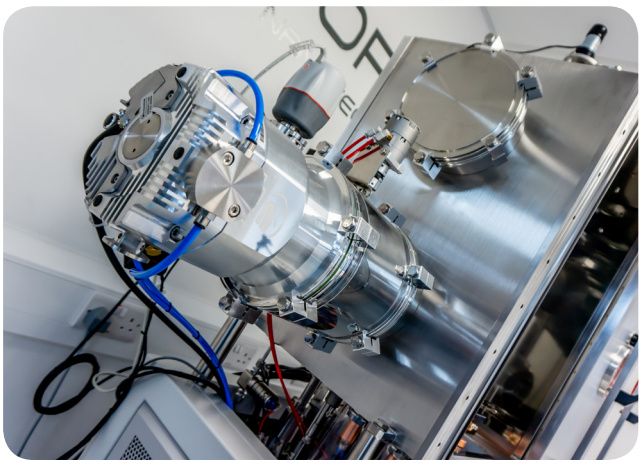
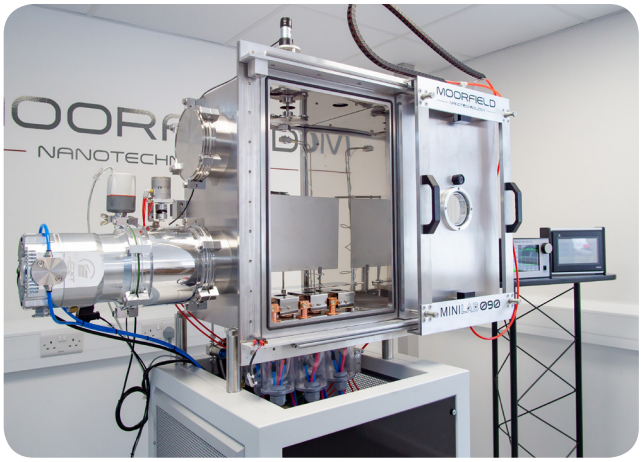
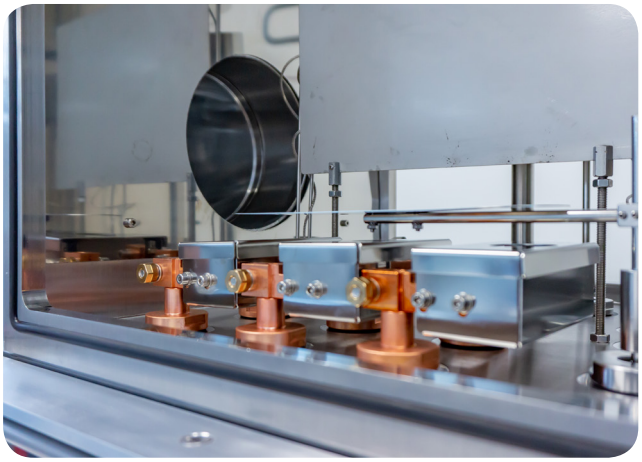
MiniLab 090 system with thermal evaporation and magnetron sputtering techniques



Sidewall positioning of the pumping system allows for a rear service/ maintenance door



The process chamber front door slides open on rails for easy in-glovebox operation



TE1 thermal evaporation sources inside a MiniLab 090 process chamber

System requirements: (typical configuration)

- Process gases: 25 psi supplies, 99.99% purity or better
- Service gas: Dry compressed air, nitrogen or argon, 60–80 psi supply
- Vent gas: N_2, 5 psi
- Power: Single-phase 230 V, 50 Hz, 13 A
- Chilled water: 18–20 °C, 3 L/min, pressure < 4 bar
- Exhaust extraction

Applications:

- Fundamental research
- Education
- Product R&D
- Pilot-scale production

All images/descriptions in this brochure are indicative only; final appearance and design subject to your exact configuration.

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Moorfield Nanotechnology Limited.
Unit 1 Wolfe Close, Parkgate Industrial Estate, Knutsford, Cheshire. United Kingdom. WA16 8XJ.
Company reg 3044718 VAT reg GB 616 3241 66

Phone +44 (0)1565 722609
Web moorfield.co.uk
Email sales@moorfield.co.uk

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