MOORFIELD
NANOTECHNOLOGY

MINILAB 090

Flexible, modular systems for high-quality physical vapour deposition

Key Features:

- Glovebox-compatible, front-loading box vacuum chamber
- Modular design
- Turbomolecular 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 for system control
- Equipped for easy servicing
- Comprehensive safety features
- Proven performance

MiniLab Systems — 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 vacuum 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.

MiniLab 090 Platform:

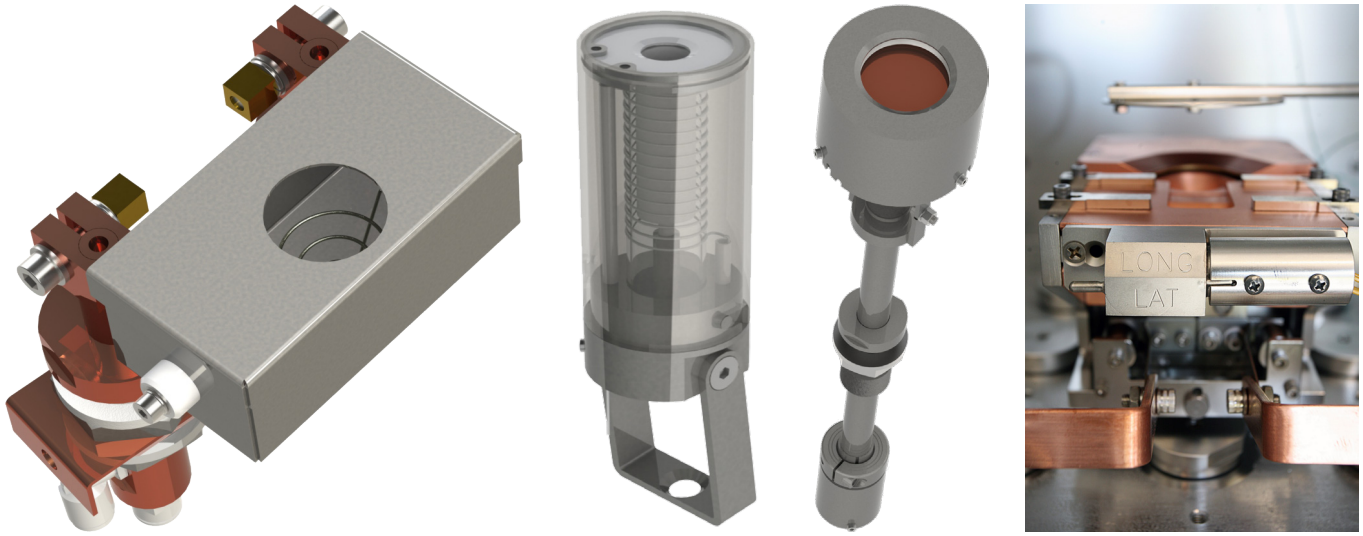
MiniLab 090 systems are floor-standing vacuum evaporators for metal, dielectric and/or organics thin-film deposition. All systems contain a box-type stainless-steel chamber with front and rear doors for glovebox integration (see below). The chamber has a high aspect-ratio, ideal for long working distances for high uniformity coating via evaporative techniques. A turbomolecular pumping system is standard,

MOORFIELD NANOTECHNOLOGY Unit 1, Wolfe Close, Parkgate Industrial Estate, Knutsford, Cheshire, UK, WA16 8XJ
+44 (0)1565 722609 +44 (0)1565 722758 @ sales@moorfield.co.uk www moorfield.co.uk

for high-vacuum base pressures of better than 5×10^{-7} mbar. Exact configuration is extremely flexible and dependant on customer budgets and applications.

Configuration and Options:

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



Above: Examples of deposition sources available for the MiniLab 090. From left to right: Moorfield TE1 source for standard thermal evaporation, Moorfield LTE-1CC source for low-temperature evaporation (LTE), Moorfield *Flexi-Head* MAGNETRON source for magnetron sputtering, and Telemark multi-pocket water-cooled electron-beam source.

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 cathodes (for metals and inorganics), and electron-beam sources (for most material classes except organics). Deposition sources are typically mounted on the chamber base-plate, 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.

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 (LTE): Up to 8 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

MOORFIELD NANOTECHNOLOGY Unit 1, Wolfe Close, Parkgate Industrial Estate, Knutsford, Cheshire, UK, WA16 8XJ
+44 (0)1565 722609 +44 (0)1565 722758 sales@moorfield.co.uk www moorfield.co.uk

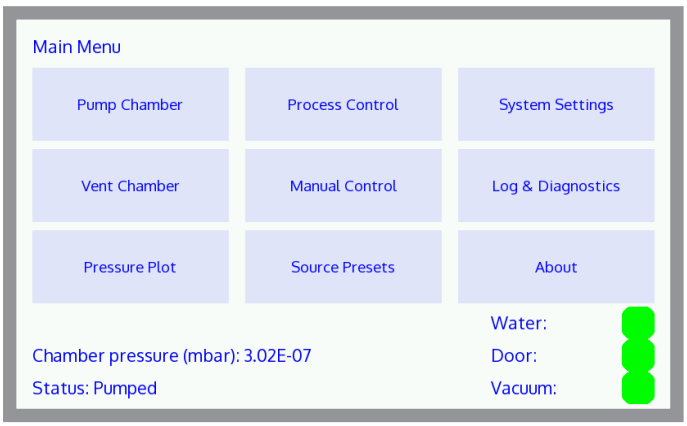
sources. Sources are water-cooled and can be connected to automated pocket indexer modules. Ferrotec 3 kW, 5 kW and 10 kW power supplies available.

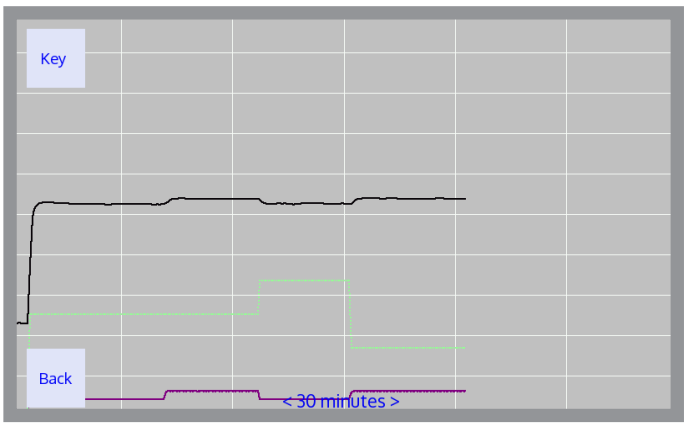
Multi-technique systems: Various combinations of all of the above can be included in MiniLab 090 systems.

For all techniques, deposition rate monitoring (via quartz crystal sensor heads) together with thin-film monitors and controllers are available.

Control System:

The unit is fitted with high-stability, industrial-grade PLC electronics. User operation is via a 7" touchscreen HMI mounted on the front panel. 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). *IntelliNet* software allows for data-logging and diagnostics to a connected PC.





Above: Screenshots from the touchscreen HMI software through which MiniLab 090 general control is carried out.

Glovebox Compatibility:

The MiniLab 090 is compatible with gloveboxes of various manufacturers. For integration, a suitable cutout is provided 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's touchscreen HMI is fitted to the glovebox frame. We also supply complete glovebox-PVD packages; please contact us for details.

Technical Specification:

Chamber: 400 mm (width) × 400 mm (depth) × 570 mm (height) stainless-steel front-loading box chamber. Hinged front door for easy access. Chamber base-plate, 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 1100 L/s. Edwards rotary or dry scroll-type backing pumps up to 15 m^3/hour.

MOORFIELD NANOTECHNOLOGY Unit 1, Wolfe Close, Parkgate Industrial Estate, Knutsford, Cheshire, UK, WA16 8XJ
+44 (0)1565 722609 +44 (0)1565 722758 @ sales@moorfield.co.uk www moorfield.co.uk

MINILAB 090

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.

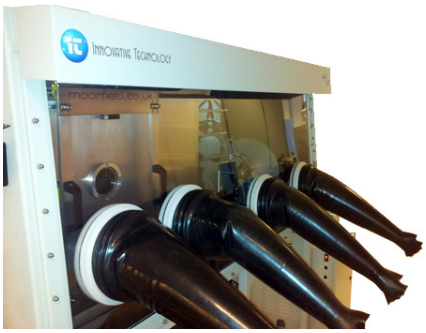
Power supplies: Various types depending on integrated techniques. All power supplies fully integrated within system electronics rack.

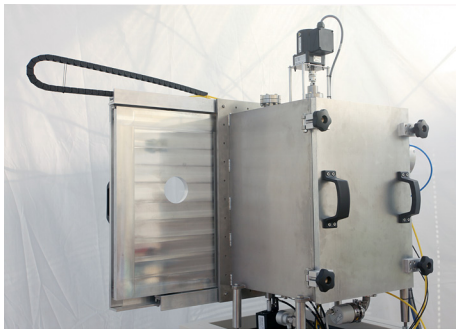
System control: Industrial-grade, high-stability PLC electronics core. Designed for safe operation and reliable vacuum integrity.

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; dependant on configuration.

Size: 1700 mm (height) × 590 mm (depth) × 1180 mm (width); dependant on configuration.





Left: MiniLab 090 system for LTE deposition fitted to 4-gloveport glovebox. Middle: MiniLab 090 chamber outside glovebox and with front door opened, revealing thermal evaporation sources inside. Right: Rear of MiniLab 090 chamber showing rear service door for easy access to chamber interior from outside glovebox.

System Requirements—Basic 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, 0.5 bar
- 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

Distributed By:

moorfield.co.uk

MOORFIELD NANOTECHNOLOGY Unit 1, Wolfe Close, Parkgate Industrial Estate, Knutsford, Cheshire, UK, WA16 8XJ
+44 (0)1565 722609 +44 (0)1565 722758 @ sales@moorfield.co.uk www moorfield.co.uk