

MINILAB 080

Flexible, modular systems for high-quality physical vapour deposition



Key Features:

- Modular design
- Front-loading box vacuum chamber
- Turbomolecular pumping systems
- Base pressures $< 5 \times 10^{-7}$ 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
- Cleanroom compatible
- 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 080 Platform:

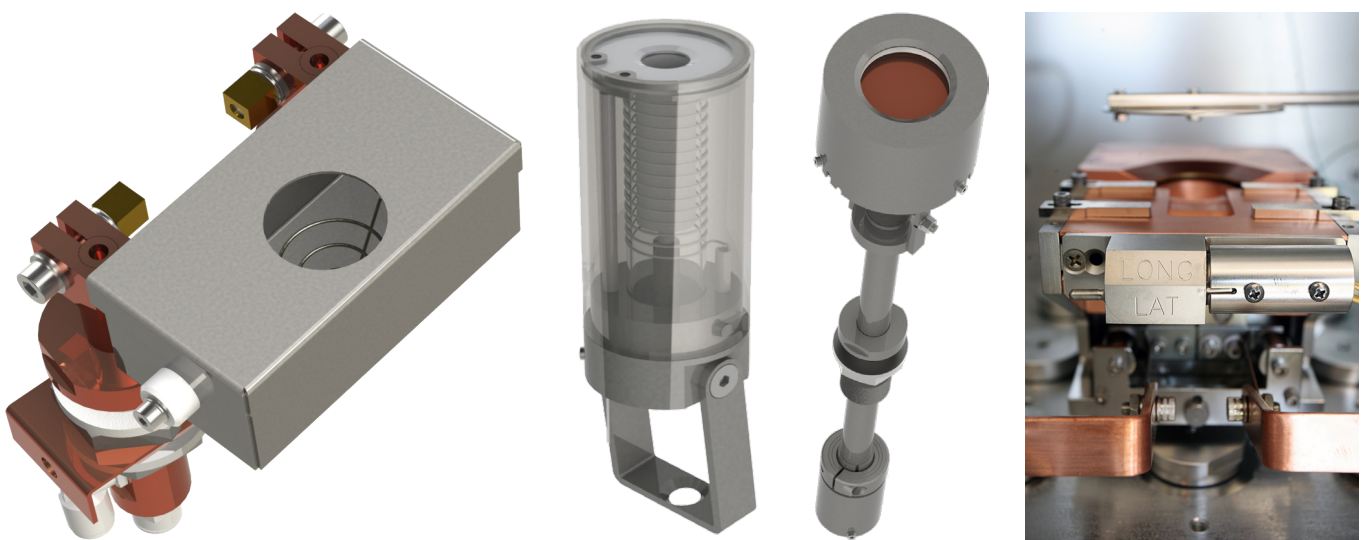
MiniLab 080 systems are floor-standing vacuum evaporators for metal, dielectric and/or organics thin-film deposition. All systems contain a box-type stainless-steel chamber with front door for loading/

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unloading. 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, for high-vacuum base pressures of better than 5×10^{-7} mbar. Exact configuration is extremely flexible and dependant on customer budgets and applications. A glovebox-compatible version of the MiniLab 080 is the MiniLab 090 (see separate brochure).

Configuration and Options:

The MiniLab 080 base configuration includes a turbomolecular pump positioned on an ISO160 port at the rear of the vacuum chamber. The vacuum chamber sits on a double-rack frame that contains all system control electronics and power supplies. MiniLab 080 systems are available with load-locks — please call for details.



Above: Examples of deposition sources available for the MiniLab 080. 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 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

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introduction. Throttle valve for protecting pumping system from gas loads.

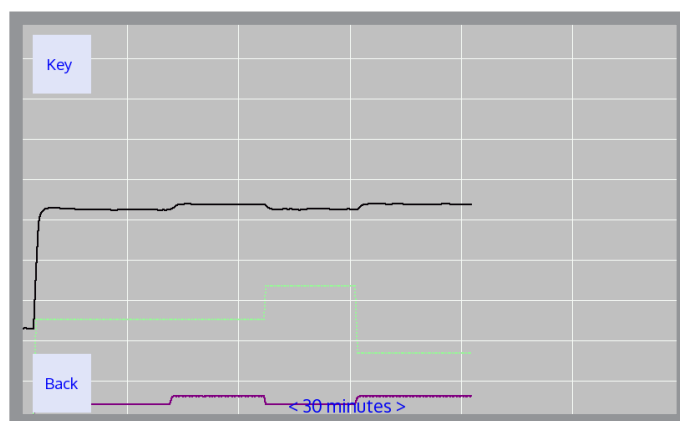
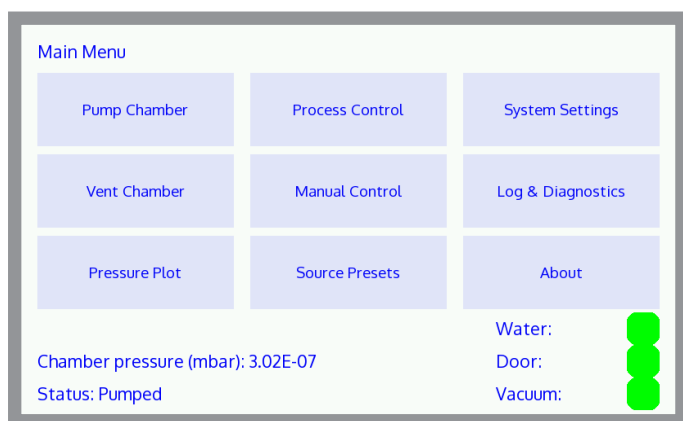
Electron-beam evaporation: Telemark multi-pocket (e.g., 6 × 7 CC or 8 × 4 CC) electron-beam evaporation sources. Sources are water-cooled and can be connected to automated pocket indexer modules. Ferrotec 3 kW, 5 kW and 10 kW power supplies available.

Multi-technique systems: Various combinations of all of the above can be included in MiniLab 080 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 080 general control is carried out.

Technical Specification:

Chamber: 400 mm (width) × 400 mm (depth) × 570 mm (height) stainless-steel front-loading box chamber with D-shaped back. 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 700 L/s. Edwards rotary or dry scroll-type backing pumps up to 15 m³/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

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for all Moorfield source types.

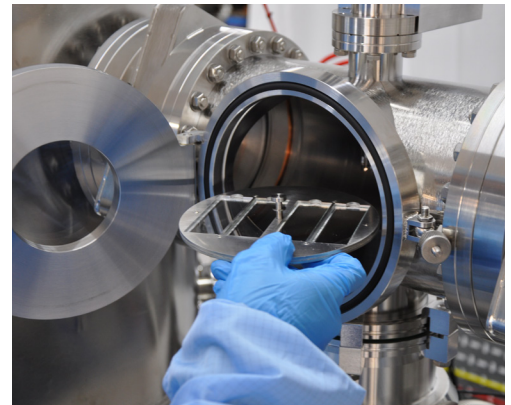
Power supplies: Various types depending on integrated techniques. All power supplies fully integrated within system electronics rack.

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 080 chamber interior, configured with 4 thermal evaporation sources, one LTE source for organics and quartz crystal sensor heads (all mounted on the base-plate). At the top of the chamber is a ceramic maze NiCr element substrate heating stage for heating to 800 °C. Centre: Operating a MiniLab 080 for electron-beam evaporation. Right: Loading a multiple substrate platen into a load-lock chamber to a MiniLab 080 system (allows for fast sample entry and minimised base pressures).

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: N₂, 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

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