

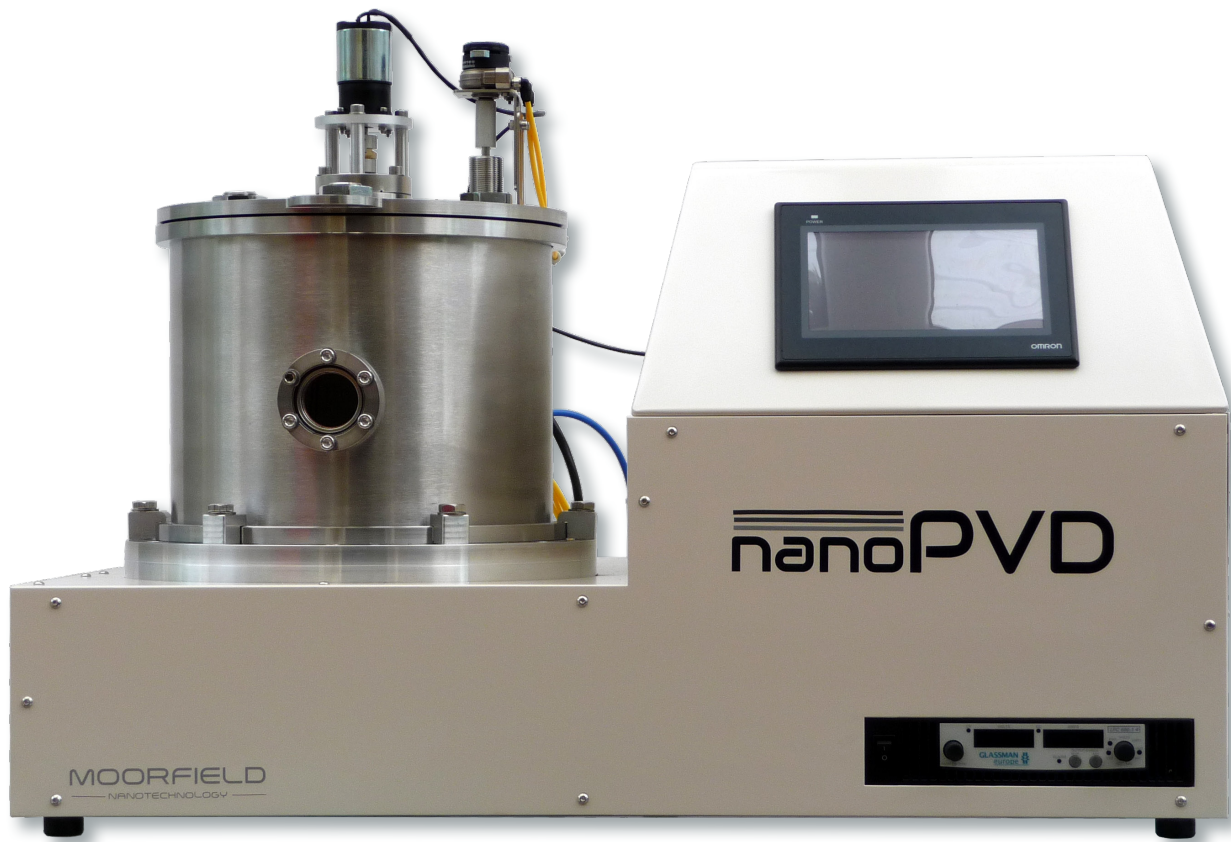
MOORFIELD

NANOTECHNOLOGY

nanopvd

Benchtop, turnkey systems for high-performance vacuum deposition

Model S10A: Reactive RF/DC magnetron sputtering system



Key Features:

- Benchtop configuration
- Up to 3 × 2" magnetron sputtering sources
- Up to 3 MFC-controlled process gases
- DC and RF power options
- Fully automatic operation via touchscreen HMI
- Up to 4" diameter, or wide-area stages
- Sample heating option
- Base pressures <math> < 5 \times 10^{-7}</math> mbar
- Define/save multiple process recipes
- Automatic pressure control option
- Equipped for easy servicing
- Comprehensive safety features
- Cleanroom compatible
- Proven performance

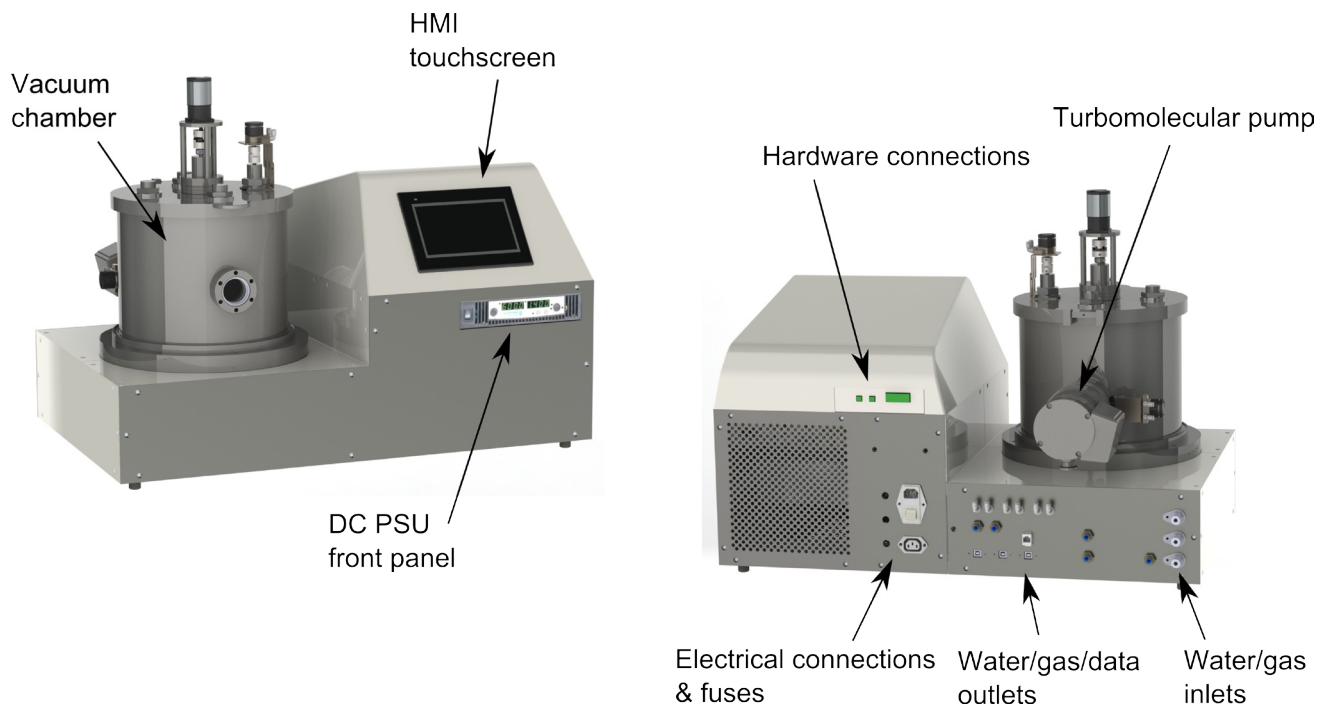
nanopVD: Model S10A

nanopVD Systems — Overview:

Moorfield have recently introduced the nanopVD series of benchtop deposition systems. Compact and suitable for benchtop location — but not to be confused with microscopy-related products — nanopVD systems are derived from proven R&D thin-film system technology and have been developed through extensive collaboration with leading academic groups. The tools are optimised for ease of use, represent outstanding value for money and are ideal where available space and budgets are key considerations — without compromising on quality of results.

Model nanopVD-S10A:

Model S10A is a magnetron sputtering system designed for repeatable coating of metals or inorganics (e.g., oxides or nitrides). At the heart of the system is a modular vacuum chamber. The chamber is designed for easy disassembly for routine maintenance. At the rear of the vacuum chamber is a port for the pumping system. The pumping system is based on a turbomolecular pump that is connected to a rotary or scroll-type backing pump.



Chamber access is via a hinged top lid. Opening the lid reveals the substrate stage, which can hold substrates up to 4" diameter. The stage can also be fitted with a heater, for platen temperatures up to 500 °C, substrate rotation and a z-shift assembly.

The system can be equipped with up to three magnetron sputtering sources, designed for use with industry-standard 2" targets. Target removal/fitting is straightforward, and bonded targets and magnetic materials are also possible. Sources are positioned for sputter-up operation. For systems with one source, this is mounted from the centre of the chamber base-plate such that it shares a central axis with the substrate stage. For systems with 2 or 3 sources, these are located on radial base-plate ports, angled towards the substrate stage in an optimised confocal geometry.

Sputtering is enabled by either DC or RF power supplies. It is also possible to equip a system with both types, and to provide for co-deposition. The addition of *PlasmaSwitch* technology enables user-selection

nanoPVD: Model S10A

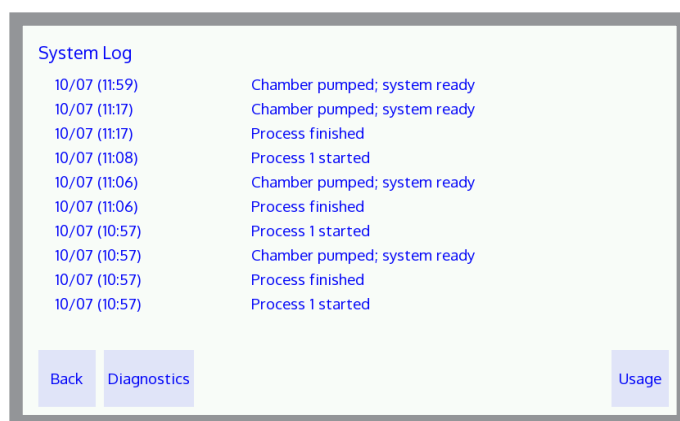
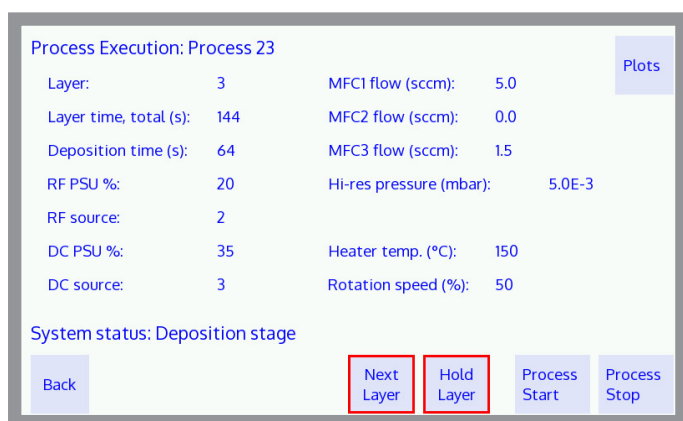
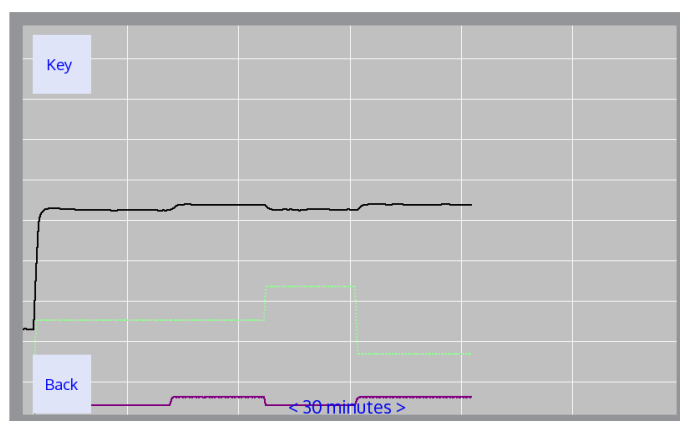
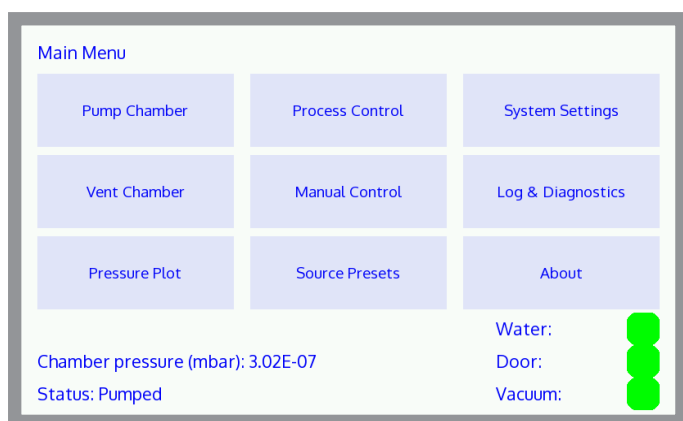
of supply-source routing (e.g., allowing multiple sources to be run from the same power supply).

The tool can be configured with up to 3 mass-flow controllers (MFCs). Standard configuration is for Ar only, but O₂ and N₂ lines are also available for reactive sputtering. During sputtering, a throttle valve restricts conduction between the chamber and pumping system, protecting the latter from high gas loads. Pressure control is upstream through MFC flow rates, but can also be carried out automatically via a PID feedback loop in response to defined pressure setpoints and high-resolution measurements.

A quartz crystal sensor head (with PC software) allows for deposition rate monitoring, for rate vs. power calibration purposes.

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. Users are able to edit, save and load multiple recipes rapidly. Recipes and live data can be logged to a connected PC.



Screenshots from the touchscreen HMI software through which all user operation of the nanoETCH is carried out.

Configuration and Options:

The standard, configuration for the nanoPVD-S10A includes one magnetron sputtering source, one MFC for Ar, standard pressure control (no feedback loop or capacitance manometer) and a single shutter for substrates up to 2" diameter. Customers must select either the RF or the DC power supply to form the

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most basic working unit. Beyond this, a variety of options allow the tool to be configured per specific budgets and applications:

- Dry backing pump
- Chamber viewport
- Fast chamber vent
- Substrate rotation
- Substrate z-shift
- Dual shutter for 4" diameter substrates
- 500 °C platen heating
- Bi-shutter
- Co-deposition
- 1, 2 or 3 magnetron sputtering sources
- DC sputtering power supply
- RF sputtering power supply
- *PlasmaSwitch* technology
- 1, 2 or 3 MFCs
- High-resolution automatic pressure control
- Quartz crystal sensor head
- Capacitance manometer for high-resolution pressure control
- Wide-area coating up to 9" diameter

System Requirements—Standard Configuration:

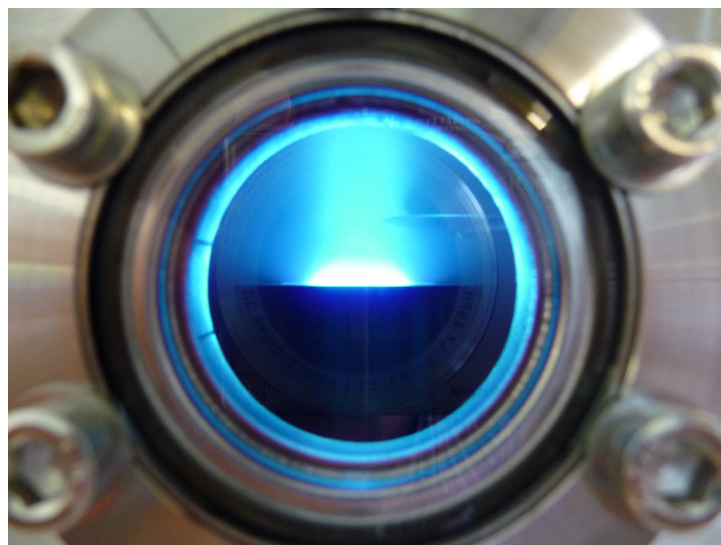
- Process gases: 25 psi supplies, 99.99% purity or better
- Service gas: Dry compressed air nitrogen or argon, 60–80 psi supply
- Power: Single-phase 230 V, 50 Hz, 10 A
- Chilled water: 18–20 °C, 1 L/min, pressure < 4 bar
- Exhaust extraction

Applications:

- Fundamental research
- Education
- Product R&D



Above: Model of magnetron sputtering source as fitted to the nanopVD-S10A.



Above: View through optional chamber viewport, showing operating magnetron sputtering source on nanopVD-S10A.

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