

CVD LABTUBE EQUIPMENT THE MASTER R&D TOOL

Bernex CVD experts have been using a research machine tool to generate their latest coatings.

Taking the essence of this equipment, Bernex now offers this industrial version on the market.

CVD LabTube is the perfect Swiss knife for all CVD thin-film developers.



Modular system architecture

Dedicated to R&D work or small concept proof validation trials, Bernex CVD LabTube is equipped with a variety of CVD precursor modules. Its modularity supports and enhances the production and extension of the coating portfolio, allowing engineers to create different combinations of coating materials, new materials or interfaces. The safe design and modularity of the system allows the users to meet the needs of present and future challenges by tuning coating properties such as adhesion, crystal structure or morphology.

The small size of the Bernex CVD LabTube unit, along with its low consumables, contributes to high costs savings during coating development.

Available modules:

- AlCl_3 generator
- HTC (High Temperature Chlorinator for MeCl_x generation, like ZrCl_4 or HfCl_4)
- NH_3 module
- BCl_3 module
- Up to four liquid modules with dedicated controlled evaporators, using carrier/purging gas supply
- Internal chlorinator module ($> 900^\circ\text{C}$)
- Solid precursor sublimator
- Possibility to combine with the Bernex MOCVD (Metal-Organic CVD) Evaporator
- Tailored options are available on demand

TECHNICAL DATA CVD LABTUBE EQUIPMENT

The equipment consists of a ceramic tube reactor with a three-zone-furnace surrounding it. Both ends of the tube reactor are equipped with water-cooled vacuum flanges to ensure tightness at the gas inlets and outlets. The unit is installed into a vented housing, equipped with gas detection systems for any hazardous or combustible medium used. An emergency stop button and function is also integrated, allowing immediate system shut-down for safety reasons.

The exhaust line of the equipment is equipped with a high-capacity condensator, which is able to settle any process by-products by means of a sophisticated ultra-low-temperature path.

The control computer is connected to programmable logic controllers (PLC) through a latest-generation bus data interface. The control computer acts as a core for the programming and execution of any automatic cycle, including the alarm system, while the PLC controls any safety-relevant and time-critical interlocks, in accordance with the latest machinery standards.

Coating zone size	95 mm diameter x 1000 mm length
Working temperature range	600 – 1300 °C
Working pressure range	1 – 800 mbar (controlled range)
Loading tray	Graphite tray allowing up to 10 pieces of ½" CNMG inserts, as well as trays depending on customer parts
Temperature control	Thermocouples (type S) with respective PID and over-temperature standalone controllers
Gas channels	There are permanent multiple gas flow channels like; H ₂ , Ar, N ₂ , NH ₃ , CH ₄ , CO, CO ₂ , H ₂ S, HCl, BCl ₃ , Hydrocarbons. The whole gas supply is split within several particular gas manifolds.
Vacuum generation	Corrosion-protected dry vacuum pump
Pumping/exhaust line	The exhaust line is equipped with a pneumatically actuated shut-off valve in the exhaust line. A cooling trap is installed in-line between the reactor outlet and the pump.
By-product condensation	High capacity cooling trap using liquid N ₂ , installed between reactor outlet and vacuum pump
Compressed air	6 ± 0.2 bar (rel.) dry, no lube required for valve actuators. Consumption < 1 kg per batch
Cooling water	One cooling water circuit at 15 °C ± 5 °C