

SOLID PRECURSOR EVAPORATION SYSTEM

Solid precursor evaporation is an essential technology for the reliable supply of processcritical materials in advanced semiconductor and thin-film manufacturing. It enables the controlled generation of a stable vapor phase from solid precursors, ensuring precise dosing and reproducible process conditions.

Technology is widely used in processes such as ALD, CVD or EPI processes, where high purity, availability, and process stability are critical. SEMPA provides various solution concepts for solid precursor evaporation, tailored to different material properties and application requirements. The following section describes the SEMPA system for **centralized solid precursor supply with an integrated pump station**.

Operation

- Designed for metal electrode materials and other solid precursor (**MoO₂Cl₂ / WCl₆ / MoCl₅ / HfCl₄ / GeCl₂ / AlCl₃ / ZrCl₄ ...**)
- Continuous supply of solid precursor
- Concentration monitoring for carrier gas application
- High temperature pressure sensor
- Flow measurement incl. temperature measurement



Safety Features



Safe operation:

- Emergency gas shutdown
- Several alarm settings for a better operation
- Multi-level user passwords
- Automatic dispense and purging capabilities
- Ethernet communication port for SCADA monitoring
- Customized signal interface
- PLC based technology with 12" color touch screen
- Safety interlocks
- High purity and safe operation by nitrogen bleed flow

Corrosivity:

- Usage of high alloy steel

Toxity:

- Cabinet ventilation
- Gas detection
- Exhaust flow alarm

Overheat protection:

- Multiple temperature sensors and switches
- High pressure software relief function
- Accurate temperature control

Safe canister exchange:

- Helium leak test port

Technical Features



Technical challenges

- Low vapor pressure:
- High temperature:
- High flow requirements:
- Heat conductivity:

- Risk for blocking by desublimation:
- Stabilisation of supply pressure :
- Less pressure drop:
- Supply pressure for highest supply pressure stability:
- Complete system solution:
- Flexibility for different canister types and processes:
- Precise delivery pressure control (+/- 50 torr):
- Precursor utilization at canister change over > 95 %:

Technical solutions

- Operation at high temperature
- Use of high temperature components
- Big valve dimension
- Individual heating for canister (heating jacket) and cabinet (oven)
- Valve integration in oven cabinet
- Active heat adjustment depending on canister fill level
- 1/2" process valves in high alloy steel, 3/4" process line
- High temperature cabinet operation (> 150°C)
- Pump station included in the system
- Multiple vessel size solution
- Active temperature control
- Special temperature control

Your VAPOR'BOT for every application

VAPOR'BOT is available for various versions meeting different process needs and budgets.
For any questions get in touch through sales@sempa.de

Technical Data

Dimension:
1600 (w) x 2120 (h) x 700 (d)

Weight:
~ 400 kg

Electrical Connection:
3 x 110 - 240 V-AC
50/60 Hz NSV

Inlets:
1 x 1/4" VCR purge gas inlet (1-6 bar)
1 x 1/4" VCR push gas inlet (1-6 bar) OPTIONAL
1 x 1/4" Swagelok connection dry pneumatic air (4-7 bar)
1 x 1/2" G Sprinkler (2-3 bar)

Outlets:
3 x 3/4" male VCR process line
1 x 1/2" male VCR vacuum
1 x KF25 pump exhaust

