

Specifications

SP3 Model 655 HF CVD Diamond Deposition Reactor

General

Diamond Morphology: Polycrystalline diamond structure can be controlled to produce nanocrystalline or microcrystalline films from 500nm to 50um thick

Deposition Chamber:

Chamber size: 58.5 cm (23") Inside Diameter

Filament area: 38.1 cm x 35.6 cm (15" x 14")

Useful Deposition Area: 33 cm x 30 cm (13" x 12")

Power consumption 35 kW max

Process Control

Recipe control:

- Automatic control via discrete recipe steps.
- Up to 59 steps.
- All parameters adjustable in each step.
- Real-time display of all parameters.
- Datalogging of all parameters.
- Manual control for maintenance and troubleshooting.
- Ethernet interface for:
 - recipe development
 - recipe management
 - data file access.

Gas control:

- 3 MFC loops
 - H₂ 5 SLM
 - CH₄ 200 SCCM
 - N₂ 10 SLM
- 2 additional gas loops available as options.

Pressure control:

- Operating range 6 to 50 Torr
- Cycle time – 30 minute pump down, 10 minute vent
- Leak test – recipe controlled, optional on every run
- Downstream closed loop throttle valve control.

Temperature monitoring:

- Chamber thermocouples (3 each) - 35° to 1000° C
- Filament optical pyrometer - 800° to 3000° C
- Chamber Lid thermocouple – 15° to 90° C

Filament power

- 200 Volts DC, 150 Amps max

Facilities Requirements

| | |
|-------------------|---|
| Footprint: | 117 cm x 132 cm (48" x 54") |
| Height: | 190 cm (74.5") |
| Weight: | 750 Kg (1650 lbs) |
| Power input: | |
| Primary power: | 480 VAC, 3 phase, 4 wire, 60 amp or 380 VAC, 3 phase, 4 wire, 80 amp |
| Vacuum pump: | 208/220 VAC, 3 phase, 4 Wire, 15 amp |
| Cooling water: | 10 gpm at 40 psi drop, 25° C maximum Requires ~25kW cooling capacity under normal operation Water must be treated – see separate recommendation |
| Access: | 60 cm clearance all sides (24") |
| Process gasses: | H ₂ (99.995%), CH ₄ (99.9%) and N ₂ (15 to 20 psi) |
| Pneumatic control | CDA (70 psi min) |
| Vacuum Pump | Required 38 CFM minimum |
| Vacuum Exhaust | Dilution: <i>Customer responsibility according to local code/regulations</i> |

Operating Environment

| | |
|------------------------|-------------------------|
| Temperature | 16° C to 24° C Relative |
| Humidity condensing | 30-60% non- |

User Interface

Graphical User interface displays system operational status, provides system monitoring and control, data logging and recipe development and storage.

Safety – CE Compliant

Hardware interlocks: Equipment and personnel protected from hazardous situations related to flammable gas, high voltages and high temperatures. (Customer supplied external flammable gas detector required.)

| Alarm Name | Interlock or Function | Device or Limits |
|---------------------------------------|------------------------------|--|
| Vacuum High | Main Vacuum Valve Closed | >50 Torr Nominal |
| Main Vacuum Valve Closed | No H2, CH4 flows, No Fil V. | Switch |
| Pump Dilution | No H2, No CH4 flows | Flow sensor |
| Vacuum Low | No Filament Voltage | <5 Torr Nominal |
| H2 Leak Detector | No H2, No CH4 flows | External Input |
| Low water Flow | No Filament Voltage | Flow Sensor |
| Pneumatic CDA Gas Cabinet Scavenge | No H2, CH4 flows, No Fil V. | CDA <60 psi Exhaust dilution interlock Scavenge air <150 CFM |

Software interlocks: User controlled through Alarm/Abort Levels on analog values and status of digital alarm inputs.