

# Specifications

## *sp*<sup>3</sup> Model 650 HF CVD Diamond Deposition Reactor

### General

Deposition rate	0.3 to 1.1 micron/hour (recipe and substrate geometry dependent)
Useful Deposition Area	900 square centimeters (140 sq inches) typical
Power consumption	≈ 35 kW plus vacuum pump
MTBF	> 500 hours
Run turn-around time	< 1 hour
PM downtime	≈ 2% for cleaning and pump maintenance
Unscheduled downtime	< 5%

### Process Control

Gas control	4 MFC loops (H <sub>2</sub> (5.0 SLM), CH <sub>4</sub> , N <sub>2</sub> , H <sub>2</sub> (500 SCCM)) - Standard
Recipe control	Up to 59 steps, Auto Mode plus Manual Mode; real-time display of all parameters; datalogging of all exceptions; all parameters adjustable in each step. Ethernet interface for recipe development, storage and management and data file access.
Pressure control	Downstream closed loop throttle valve

### User Interface

Graphical User interface (Windows XP0S) 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. (External flammable gas detector required.)
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Alarm Name	Interlock or Function	Device or Limits
Vacuum High	Main Vacuum Valve Closed	>50 Torr Nominal
Main Vacuum Valve Closed	No H <sub>2</sub> , CH <sub>4</sub> flows, No Fil V.	Switch
Pump Dilution	No H <sub>2</sub> , No CH <sub>4</sub> flows	Flow sensor
Vacuum Low	No Filament Voltage	<5 Torr Nominal
H <sub>2</sub> Leak Detector	No H <sub>2</sub> , No CH <sub>4</sub> flows	External Input
Low water Flow	No Filament Voltage	Flow Sensor

Software interlocks	User controlled through Alarm/Abort Levels on analog values and status of digital alarm inputs.
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## **Vacuum Pump (user supplied)**

Pump type	Alcatel 2063 or equivalent
Pump footprint	30 cm x 86 cm (12" x 34")
Cycle time	30 minute pump down, 10 minute vent
Operating range	10 to 50 Torr
Accuracy	± 500 mTorr
Leak test	Software controlled, optional on every run
Power input	208 VAC, 3 phase, 4 wire, 15 amp

## **Facilities Requirement**

Footprint	117 cm x 132 cm (48" x 54" )
Power input	480 VAC, 3 phase, 4 wire, 70 amp 208 VAC, 3 phase, 5 wire, 20 amp
Cooling water	10 gpm at 40 psi drop, 20° C maximum
Access	60 cm clearance all sides (24")
Process gasses	H2 (99.99%), CH4(99.9%), N2(15-20psi)
House N2	N2 for pneumatic actuators (70psi)

## **Option Package for Planar Array Deposition**

### **Coating Performance**

Deposition area	33 cm x 30 cm (13" x 12" )
Growth Rate	0.3-1.0µ/hr (recipe dependant)

### **Coating Uniformity**

+/- 20% up to 300mm

### **Includes**

Molybdenum filament array assembly, 2-dimensional  
Quartz Substrate holder  
Substrate tray support assemblies  
All required fasteners

## **Option Package for Three-Dimensional Array Deposition**

### **Coating Performance**

Deposition area	33 cm x 28 cm (13" x 11" )
Growth Rate	0.3-0.7µ/hr (recipe dependant)
Target sizes	Up to 1-inch diameter and 3 inches long

### **Coating Uniformity**

+/- 20% within optimized envelope

### **Includes**

Molybdenum filament array assembly, 3-dimensional  
Molybdenum substrate tray  
Substrate tray support assemblies  
All required fasteners

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## Specifications

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## Option Package for Flat Cutting Tool Deposition

### Coating Performance

Deposition area 33 cm x 28 cm (13" x 11" )  
Growth Rate 0.3-1.0  $\mu$ /hr (recipe dependant)

### Coating Uniformity

+/- 20% run to run and insert to insert

### Includes

Molybdenum filament array assembly  
Molybdenum substrate tray  
Substrate tray support assemblies  
All required fasteners

## Option Package for Round Cutting Tool Deposition

### Coating Performance

Deposition area 33 cm x 28 cm (13" x 11" )  
Growth Rate 0.3-0.7  $\mu$ /hr (recipe dependant)  
Target sizes Up to 1-inch diameter and 3 inches long

### Coating Uniformity

+/- 20% at tool tip

### Includes

Molybdenum filament array assembly  
Tool holder assemblies for tools from 3mm shank to 12mm shank  
Round tool quartz fixture kit  
All required fasteners

## Accessories (supplied with 650)

Filament array loading fixture  
One roll of tungsten filament wire (1000 M)  
Filament maker  
Vacuum accessories kit  
Tool kit

## Options

Vacuum Pump  
Two-dimensional filament array  
Three-dimensional filament array  
Quartz kit, round tool fixturing  
Substrate Tray assembly, Molybdenum  
Substrate Tray package, Quartz  
Consumable spares

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