

Spray Pyrolysis Machine



Spray Chamber

1. Vacuum sealed cylindrical chamber with dish-end at back and front-side
2. Viewing port at front door, LED lightings inside the chamber
3. Dimension (Diameter x Length/Depth): 1200 mm x 1300 mm
4. Material of construction – Stainless steel 304 grade
5. Coating area - 500 mm x 500 mm (Customizable to 200mm x 200mm) as per requirement if required
6. Stand-alone construction with Wheels and anti-Vibration mount
7. Vacuum Sealed feedthroughs/gland for electrical, air/N₂, solution into the chamber

The chamber is to be custom designed to perform Spray coating in an Inert atmosphere + Low Pressure (100-200 Torr) and at normal Atmospheric pressure.

1. Rotary vacuum pump with gauge + Butterfly Valve + T-Section and Leak valve be provided. Rotary pump of capacity minimum– 50 LPM or higher
2. Provision to perform Spray coating at atmospheric Pressure – Provision for inlet with filter and Exhaust to be attached to the chamber. Vacuum sealed Valves to be attached to the chamber for this purpose

Spray Nozzle and Fluid dispensing system

1. Ultrasonic nozzle with corrosion protection (Teflon) – 1 quantity Nozzle Working frequency – 120 kHz Aerosol Droplet size – 15 microns Flow rate – 1 to 20 ml/min Viscosity of the precursor – less than 10 cps
2. Low Volume Low Pressure Pneumatic nozzle - 1 quantity with minimum overspray, Orifice diameter of 0.046 inch and rotary adjustable flow control mechanism
3. Syringe pump – 1 quantity with controller and drive unit, Single channel, Flow rate – 0.2 nano liter/min to 80 ml/min, capacity – 10 micro litre to 60 ml syringes
4. Peristaltic pump – 1 quantity. Flow rate – 5 micro L/min to 60 ml/min No: of channels: Single

Advanced XYZ Gantry

1. Dimensions: 900 mm x 800 mm x 200 mm (L x B x H)
Stroke length X-axis – 700 mm
Stroke length Y-axis – 700 mm
Stroke length Z-axis – 150 mm
Theta – 90o
Gantry to be protected with anodized aluminum enclosures
Additional passive X-axis for stability
Gantry stroke length with sufficient offset to be provided in order to access to the whole area by the four nozzles

Actuators

1. X-axis - Servomotors with absolute encoder
2. Y-axis - Servomotors with absolute encoder
3. Z-axis - Servomotors with absolute encoder
4. Servomotor controlling Z-axis is equipped with brake
5. Servo Drives + Connection wires and accessories

Automation of the machine and Control Panel

1. Programmable logic controller (PLC) Based Automation with 4 axis Motion Control system
2. 16 digital input and 16 output module
3. 4 analogue input/output module
4. Human Machine Interface (HMI) as input device - 7 inch touch screen
5. Pneumatic control valves manifolds to operate Valves
6. PLC programming and Integration
7. Control panel accessories - MCB & Control Switches, contactors and power supply, Wiring equivalent to IEC standard

Substrate heater

1. Mo/SiC Hot plate: Dimension – 150 mm x 150 mm (Total size ~ 400 mm x 400 mm) - 1 Quantity
2. Molten Tin Bath Substrate heater: Dimension – 150 mm x 150 mm (Total size ~ 400 mm x 400 mm) - 1 Quantity
3. Kanthal furnace heater coil, K-Type Thermocouple Maximum Temperature – 500oC +/- 5oC Temperature controller (EMKO / Fuji) with Thyristor controller Programmable PID controller using PLC in conjunction with a thyristor and analogue input/output

Nitrogen Gas (To use as Carrier gas)

1. Nitrogen bottle with regulator
2. Capacity – 50 L, 200 bar Tools & Pneumatic hose