H1000 Thermal System

-65° to 400°C

Micromanipulator

Founded 1956

Configurations

- Coaxial
- Triaxial
- High Power
- Ambient to 400°C
- 0° to 400° C
- -65° to 400° C
- Probe station or stand alone
- Host programmable

Uniformity (Degree C)

- Min temp to -15 deg and 250C to max: +/- 2.5%
- -15 to +50 degree: +/- 1.0%
- 50 to 250 degree: +/- 1.5%
- 10 calibration points across temperature range

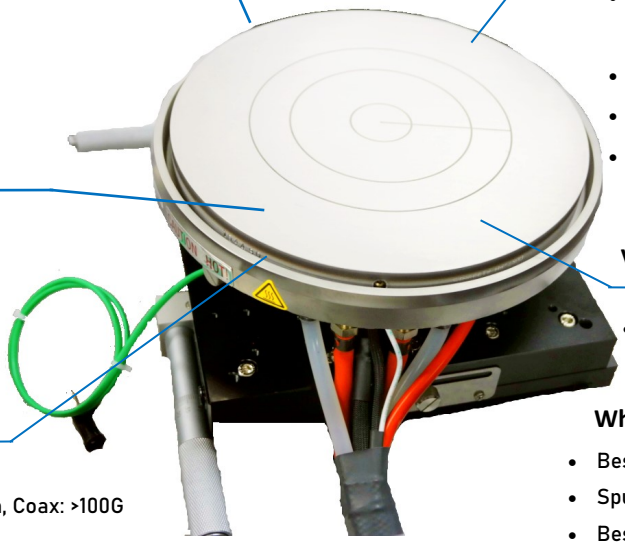
Isolation

Ambient

- Surface to ground: Triax: >5T ohm, Coax: >100G ohm
- Surface to guard: Triax: >5T ohm, Coax: N/A
- Guard to ground: Triax: >5T ohm, Coax: N/A

Max Temp

- Surface to ground: Triax: >10G ohm, Coax: >1G ohm
- Surface to guard: Triax: >5G ohm, Coax: N/A
- Guard to ground: Triax: >5G ohm, Coax: N/A



Sputter Platinum Chuck Surface

- Sputtering is a process whereby atoms are ejected from a solid target material due to bombardment of the target by energetic particles.
- Thermal expansion isn't an issue because the sputtered surface mimic's the base material.
- 2x stronger bond than traditional plating.
- 2x more planar than traditional plating.
- The sputtered platinum surface provides superior electrical conductivity to sample backsides.

Vertical Expansion

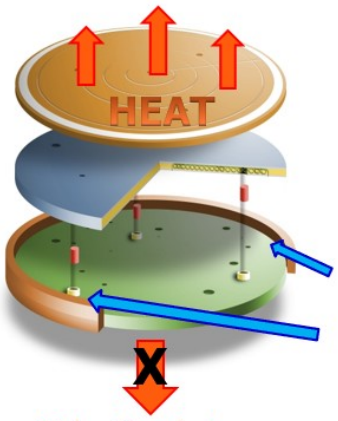
- < 10 µm per 100 degree C

Why Micromanipulator?

- Best planarity at temperature
- Sputter platinum surface
- Best isolation at temperature
- Field upgradeable configurations
- Fast ramp rates
- Cooled radiator improves safety and stage integration
- Most available configurations—choose what you need now, upgrade later
- The H1000 is a proven platform—Micromanipulator has been manufacturing thermal chuck systems for more than 40-years

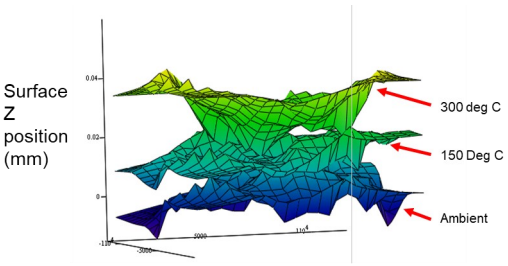
The combination of our specialized sputtering, radiator and trade secret designs provide the finest thermal systems available

Cooled Radiator



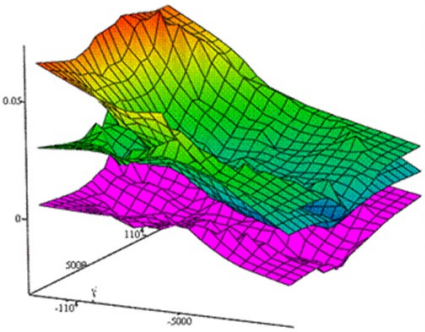
No heat transfer to probe station

Micromanipulator planarity performance



Chuck surface X-Y position

Competitor planarity performance



Micromanipulator

Made In the U.S.A.

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H1000 Thermal System

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Thermal Range	200mm: -65C/0C/Ambient to +400C	300mm: -55C/0C/Ambient to 300C
Isolation	Ambient Surface to ground: Triax: >5T ohm, Coax: >100G ohm Surface to guard: Triax: >5T ohm, Coax: N/A Guard to ground: Triax: >5T ohm, Coax: N/A	Max Temp Surface to ground: Triax: >10G ohm, Coax: >1G ohm Surface to guard: Triax: >5G ohm, Coax: N/A Guard to ground: Triax: >5G ohm, Coax: N/A
Time to Temp	200mm (to 400 degree C) < 45 min (AC/DC)	300mm (to 300 degree C) < 45 min (AC) 55 min (DC)
Configurations	Coaxial/Triaxial, AC or DC drives	
Cooling media	Air + fluid above ambient, fluid below ambient	
Resolution	0.1 degree C.	
Stability °C	+/- 0.3 above 50 degree, +/- 1 degree within 5 degree of ambient.	
Uniformity °C	Min temp to -15 deg and 250C to max: +/- 2.5% -15 to +50 degree: +/- 1.0% 50 to 250 degree: +/- 1.5%	
Vertical Expansion	< 10 µm per 100 degree C	
Surface flatness + planarity on prober	+/- 5 µm (ambient) , < +/- 12.5 µm throughout temp range	

H1000 Thermal Controller

HC1000 DC thermal controller
400° C to –65°C

Specialized radiator & planarity built into every chuck

Feature	Description	Benefit
Active Mount Cooling	Cooled radiator	The radiator prevents chuck heat from transmitting to sensitive probe station elements like the wafer stage drive. Promotes safe operation for operators.
Planarity Control	Kinematic	An important consideration because our customers expect the thermal chuck surface to remain planar, not just at ambient, but at temperature as well. Furthermore, our customers expect the planarity to be repeatable over time or repeated temperature cycles, for example, when transi-tioning from ambient, to 150C, and back to ambient.
Surface Contact Material	Sputtered Platinum	The sputter process provides superior durability compared to plating (plating is OK for ambient chucks but presents problems for thermal chucks with expansion and contraction). Platinum provides excellent conductivity to substrate.
Surface Base Material	Ceramic	The ceramic surface (with triaxial versions) provides superior electrical isolation compared to competitive offerings, especially at higher temperatures. High isolation is important for the best low noise measurement performance.
Plumbing Integration	Direct stage integra-tion	Micromanipulator installs integrated thermal chuck plumbing during manufacturing for future "plug and play" thermal chuck upgrades, but also to make certain the plumbing does not interfere with or restrict the positioning performance of the wafer stage.
Temperature Control	PID	PID control is a control loop feedback mechanism that ensures very fast temperature cycling times with minimal overshoot. This allows the thermal chuck to reach temperature quickly, which means you can start your tests sooner.

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