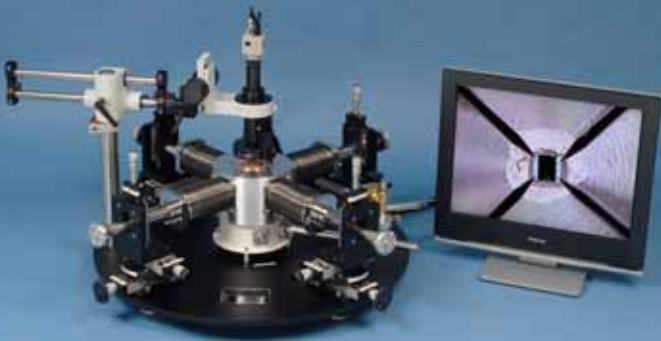


Micro-manipulated Cryogenic & Vacuum Probe Systems

ST-500 Series



The Janis ST-500 series probe stations are high performance research instruments designed to provide affordable vacuum and cryogenic probing of wafers and devices. The proven ST-500 cryostat is the platform for these probe stations, and includes low vibration technology (originally designed for high spatial resolution optical microscopy) to provide outstanding sample positional stability. Researchers around the world are using these systems to conduct research in a wide variety of fields, including MEMS, nanoscale electronics, superconductivity, ferroelectrics, material sciences, and optics.

Variable Temperature Cryostat

A cryostat is at the center of every cryogenic probe station, and Janis has been a world leader in the design and manufacture of research cryostats for over forty-five years. The ST-500 cryostat provides a mechanism for cooling samples efficiently and effectively. The sample is mounted on a removable sample chuck (holder); sample chucks are available in a variety of configurations including grounded, coaxial, and triaxial. The sample is fully surrounded by a thermal shield to minimize radiant sample heating, resulting in the lowest possible sample temperature. A high efficiency transfer line is used to provide sample cooling using either LHe or LN₂, and includes an integrated adjustable cryogen flow control valve. Two silicon diode thermometers and a high wattage heater are used to regulate and monitor the sample temperature within the broad operating temperature range of ~3.5 K – 475 K. Optional optical access through the cryostat bottom flange makes transmission experiments possible.

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Micromanipulated Translation Stages

Up to eight independent X, Y, Z stages provide precise control over the probe motion within the range of travel. Each stage includes graduations in increments of 10 – 12.5 microns, with typical useful resolution of 5 – 6.25 microns. Stages used for microwave probes include theta rotation adjustment for planarization of the probe.

Probe Options

A wide variety of probe options are available and different options can be specified for each probe stage. Typical configurations include:

1. LOW FREQUENCY (DC). Tip diameter, radius, and material can be specified by the user to match a specific application and pad size.

1.1 CX: Coaxially shielded low frequency probe with BNC feedthrough and 50 ohm coaxial cryogenic cable.

1.2 TX: Triaxially shielded low frequency probe with triax feedthrough and 50 ohm triaxial cryogenic cable.

1.3 KEL: Kelvin probe, available in either CX or TX configuration. The KEL probe includes two coaxial or triaxial cryogenic cables joined at the probe holder, and wired to separate BNC or triax feedthroughs. One cable is used for forcing current (or voltage) through (or across) the device under test (DUT), and the other cable is used to sense the voltage (or current) passing across (or through) the DUT. KEL probes are typically used for low resistance measurements in order to eliminate cable resistance from the measurement.

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Probe Options

2. HIGH FREQUENCY.

2.1 MW: Microwave probes for high frequency measurements. MW probes are available in 40, 50, and 67 GHz ranges, and include low profile probe holders with beryllium copper or tungsten spring loaded tips. The probe configuration and pitch can be specified by the user, as ground-signal-ground (GSG), GS, or SG, with pitch range from 50 - 1250 microns. Each probe is connected to a semi-rigid coaxial cable terminating in a type K or V connector designed for low insertion and low return loss.

3. FIBER OPTIC PROBE ARM.

One or more probe ports can be configured to accept an optical fiber, for precise optical excitation of wafers and devices.

4. INTERCHANGEABLE ARMS.

DC, MW and fiber optic probe arms can easily be interchanged with one another. Spare probe arms in various configurations can be supplied with the system or at a future time.

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Standard Equipment

- Low vibration model ST-500 cryostat with integrated vacuum chamber, sample mount, and cooled radiation shield.
- High efficiency LHe/LN₂ transfer line with needle valve flow control.
- Two silicon diode thermometers, installed at the control heat exchanger and at the sample mount.
- Cartridge heater for temperature control.
- Cooled radiation shield window.
- Four integrated X-Y-Z probe station stages with probe support arms, cooled probe holders and LF, MW or fiber optic probes.
- Four edge welded metal bellows to permit probe translation.
- 10-pin electrical feedthrough.

Optional Equipment

- Isolated, coax or triax chuck with feedthrough and wiring.
- Monoscope with fiber-optic light source, vertical boom stand with vertical and horizontal adjustment, CCD camera, LCD color monitor. Available models include zoom of 7:1, 12.5:1, 16:1.
- Cryogenic temperature controllers from the leading controller suppliers. Each controller supplied by Janis includes full integration and testing with the system.
- Turbopump station including 52 L/s turbomolecular pump, wide range vacuum gauge and readout, stainless steel flexible pumping line. Available with mechanical or dry diaphragm backing pump.
- Vibration isolation table, 30" x 30" work surface secured to black anodized frame utilizing pneumatic isolators.
- Portable ultra-quiet air compressor for vibration isolation table.
- LN-50 liquid nitrogen storage dewar, with adapter to match the Janis high efficiency transfer line.
- Rapid warm-up power supply (1 hour).
- Pumping station vibration isolator.

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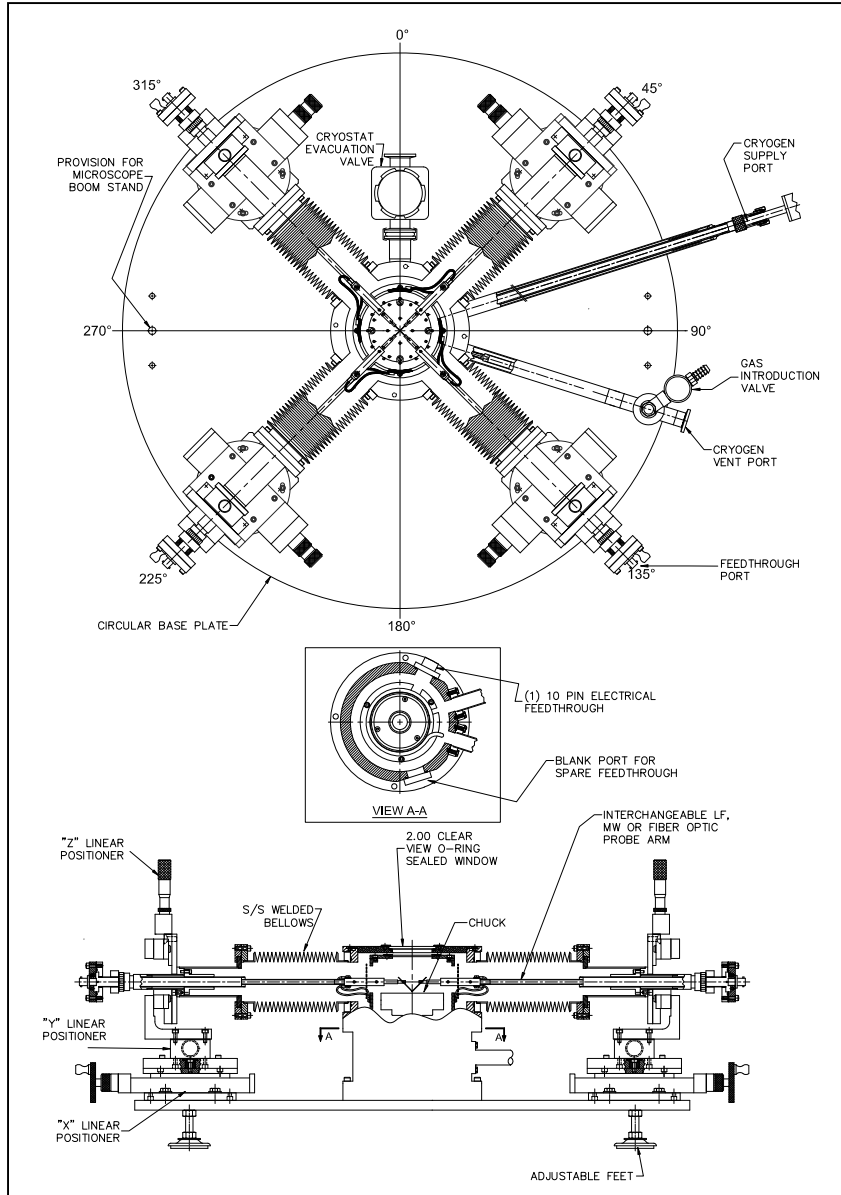
ST-500 Series

Specifications		
Temperature range:	~3.5 K to 475 K (DC Probes) (650 K optional), ~3.5 K to 425 K (MW Probes) (475 K optional)	
Temperature stability:	+/- 50 mK	
Cooldown time:	~30 min to 10 K, 60 min to 5 K	
Vibration level:	+/- 25 nm	
Positional drift:	+/- 150 nm in 30 minutes	
Frequency range:	DC/LF Probe: DC to 20 MHz Microwave probe: 0-40 GHz, 0-50 GHz, 0-67 GHz	
Optical access:	2.0" clear aperture	
Optical resolution with monoscope:	7:1 zoom, 5 microns 12.5:1 zoom, 3.4 microns 16:1 zoom, 2.2 microns	
	ST-500-1	ST-500-2
Maximum sample size:	52 mm diameter	52 mm diameter
Probe travel:		
X-axis:	25 mm	50 mm
Y-axis:	25 mm (15 mm with MW Probes)	40 mm * (35 mm with MW Probes)
Z-axis:	10 mm	18 mm
Probe translation (incremental units of graduation): X, Y, Z-axes:	10 microns	12.5 microns
Probe translation resolution: X, Y, Z-axes:	5 microns	6.25 microns

* 50 mm including Y-stage pivot.

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