JANIS RESEARCH COMPANY

Micro-manipulated Cryogenic & Vacuum Probe Systems

Cryogen Free Series

The Janis cryogen-free series probe stations provide the researcher with vacuum and cryogenic probing capabilities without requiring the use of liquid cryogens. 10 K and 4 K cryocoolers utilize proven Gifford-McMahon (G-M) technology for reliable and affordable sample cooling. Typical applications include MEMS, nanoscale electronics, superconductivity, ferroelectrics, material sciences and optics.

Cryostat

Every cryogenic probe station requires a cryostat, and Janis has been a world leader in the design and fabrication of research cryostats for over 45 years. The successful application of this extensive cryogenic design experience now enables cooling and probing of samples without the use of cryogens, and without the introduction of unwanted vibrations and noise to the sample. The sample is mounted on a removable sample holder (chuck); sample chucks are available in a variety of configurations including grounded, coaxial, and triaxial. The sample is fully surrounded by a thermal radiation shield, resulting in the lowest possible sample temperature. The cryocooler is connected to the chuck and thermal shield via proprietary low vibration / high thermal conductivity links. Silicon diode thermometers and a high wattage heater are used to monitor and control the sample temperature stability within 100 mK at any temperature within the operating range.

JANIS

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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

- Cryocooler with matching compressor and flexible helium gas lines, fully charged with high purity helium gas.
- Integrated pneumatic vibration isolated support stand with air storage tank.
- Two silicon diodes installed for control and monitoring of sample temperature.
- Cartridge heater for temperature control.
- Cooled thermal radiation shield with window installed.
- 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.
- Electrical feedthrough for thermometers and heater.

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 42 L/s turbomolecular pump, wide range vacuum gauge and readout, stainless steel flexible pumping line. Available with mechanical or dry diaphragm backing pump.
- Portable ultra-quiet air compressor for vibration isolation table.
- Micromanipulated optical port, for optical probing/excitation of samples.
- Integrated high temperature stage, to extend upper temperature limit to 500 K.
- Rapid warm-up option (90 minutes).
- Pumping station vibration isolator.

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Specifications	
Base temperature:	Model specific, ranging from 4.5 K to 15 K
Upper temperature limit:	325 K standard, 500 K optional
Frequency range:	DC/LF Probe: DC to 20 MHz Microwave probe: 0-40 GHz, 0-50 GHz, 0-67 GHz
Optical resolution with monoscope:	7:1 zoom, 5 microns 12.5:1 zoom, 3.4 microns 16:1 zoom, 2.2 microns
Probe travel:	Model specific, range is:
X-axis:	50 mm
Y-axis:	25-40 mm
Z-axis:	10-18 mm
Probe translation (incremental units of graduation): X, Y, Z-axes:	10-12.5 microns
Probe translation resolution: X, Y, Z-axes:	5-6.25 microns

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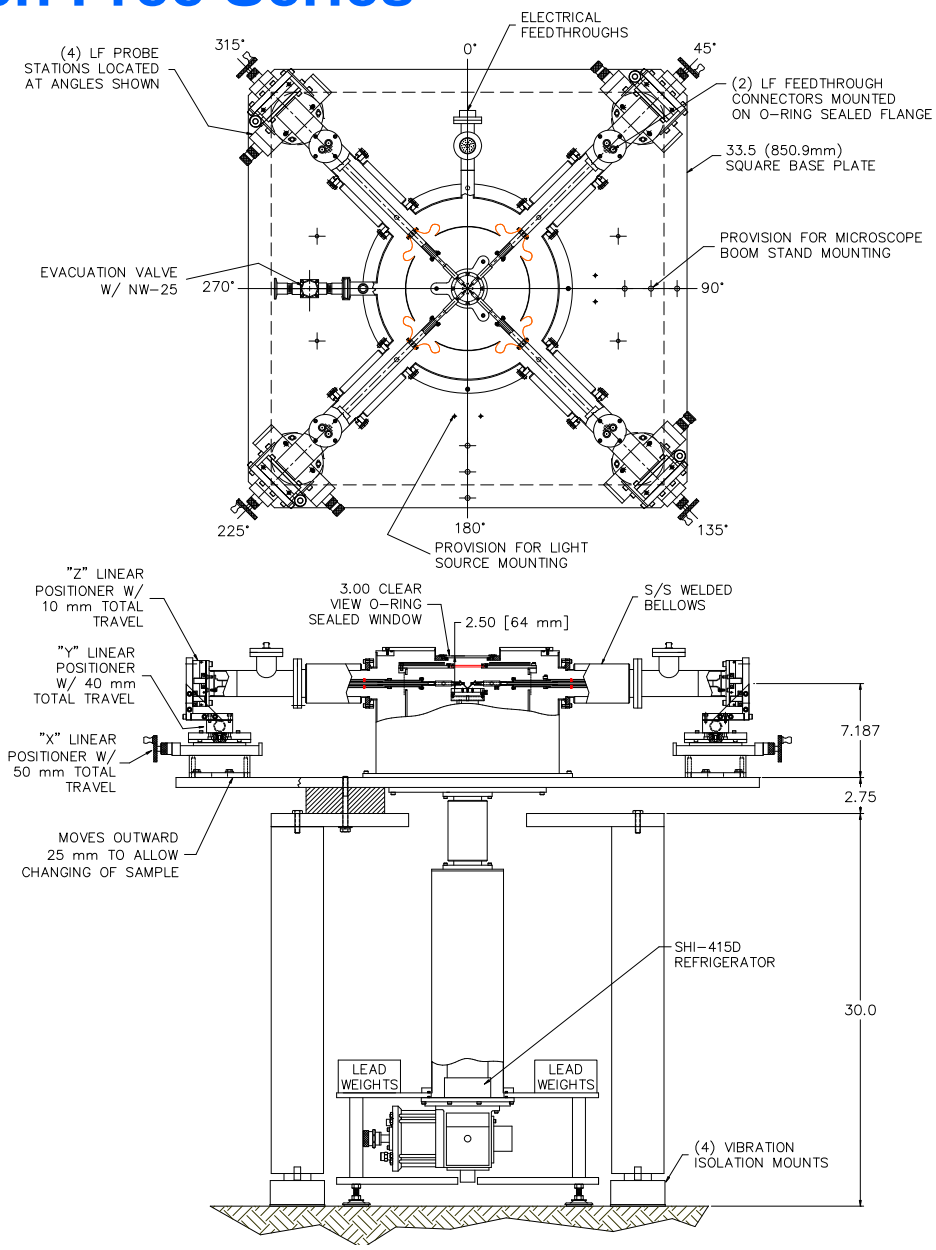

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