

Lab Cryogenic Product Overview





environment by  JANIS

The experience and the expertise to supply the system best suited for your cryogenic requirements

Founded in 1961, Janis Research quickly became one of the foremost suppliers of cryogenic equipment in the world. Janis' lab cryogenics business became part of Lake Shore Cryotronics in 2020 and is now known as *environment by Janis*. Our combination of expertise innovates, creates new products, and enhances existing ones as new applications requiring cryogenic equipment are developed.

Through the years, we have been continually dedicated to the design, fabrication, and delivery of the best systems and components in the industry. Using state-of-the-art CAD/CAM systems, we have developed the broadest range of cryogenic products in the business. With an installed base of thousands of systems and a staff of highly skilled scientists, we have the expertise to supply the system best suited to meet your cryogenic requirements.

We recognize that obtaining a cryogenic system represents a long-term commitment for most scientists; therefore, we are devoted to providing you with the highest level of quality and customer support. Just a few of the ways we accomplish this are:

- Sales and service are provided through a worldwide network of trained and knowledgeable representatives
- Experienced applications engineers are available to discuss your specific application and offer advice on the best cryostat configuration to meet your needs and budget
- A stable workforce draws on decades of combined service and applies this experience to the assembly of each cryogenic system
- Records on all systems, modifications, and design improvements are meticulously maintained for the reference of any future user
- Turnkey systems are supplied by offering a full line of cryogenic accessories
- Each system is fully integrated and tested before shipping

Our cryostats are available for a broad range of applications, with cooling provided by liquid nitrogen, liquid helium, or mechanical refrigerators. Each cooling mechanism has distinct advantages and preferred applications, and an engineer can assist in choosing the best cooling method for your application. Some of our key products include:

- Custom-engineered cryogenic solutions
- Superconducting magnet systems
- Cryogenic and vacuum micro-manipulated probe stations
- Continuous flow and reservoir cryostats, using liquid helium or liquid nitrogen
- 10 K, 4 K, and 1.5 K mechanical closed-cycle refrigerators (CCRs)
- Low-vibration pulse tube refrigerators

For the most detailed and up-to-date information on *environment by Janis* products (including specifications and key physical dimensions), please visit www.lakeshore.com.

Cryogen-free cryostats

Closed-cycle refrigerator (CCR) cryostats provide low temperature environments (as low as 1.5 K) without the need for liquid helium or nitrogen. As a result, these systems are simple to operate and inexpensive to maintain. CCR models are available in both sample-in-vacuum and sample-in-exchange-gas (top-loading) configurations.

1.5 K continuous CCR cryostats

Top-loading helium exchange gas cryostat. The closed-cycle cryocooler design allows nearly unlimited operation. Optimized for two-loop precise temperature control, and available in optical or non-optical configurations. The optical version has four orthogonal sets of windows that can be used in either transmission or reflection geometry.

4 K CCR cryostats

These cryostats can be used as a direct replacement for liquid helium cooled systems. Depending upon the cost of liquid helium and hours of operation, typical annual cost savings can range from \$20,000 to \$60,000 and more. We offer many 4 K CCR systems, with cooling powers ranging from 0.2 to 2.0 W at 4.2 K. In addition to complete cold finger and exchange-gas-cooled cryostats, bare 4 K cryocoolers can be provided for use in cryostat shield cooling, helium recondensing, astronomical applications, and more.

10 K CCR cryostats

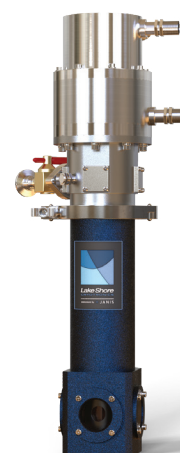
Our CCR designs begin with cryocoolers supplied by several of the world's leading manufacturers of cryogenic refrigerators. We have designed and built CCR systems for an extremely broad range of applications including VSM, Mössbauer, matrix isolation, Hall measurements, microwave device cooling, detector cooling, x-ray and neutron diffraction, and many more. Temperature ranges are available from 7 K to 800 K.



PT-SHI-950-LT
1.5 K cryostat



SHI-950
4 K cryostat



CCS-100
10 K cryostat

He and LN₂ cryostats

Continuous-flow cryostats

SuperTran (ST) sample-in-vacuum and SuperTran-VP (STVP) sample-in-flowing-vapor systems are reliable and flexible tools for reaching low temperatures in the laboratory. These continuous-flow cryostats offer quick sample cooldown, compact designs, and maximum LHe efficiency. ST and some STVP systems can also be operated with LN₂ when lower temperatures are not required.

SuperTran sample-in-vacuum models cover <2 K to 800 K. In addition to general-purpose systems, we offer SuperTran systems designed for specific applications, including FTIR, ESR, UHV, Hall effect, microscopy, and more.

SuperTran-VP models provide sample-in-vapor cooling from 1.5 K to 300 K and higher, and include a top-loading sample probe. Rapid sample changes are possible, and samples with poor thermal characteristics (i.e., liquids and powders) or irregular shapes can be cooled easily. Application-specific models include NMR, ESR, and FTIR.

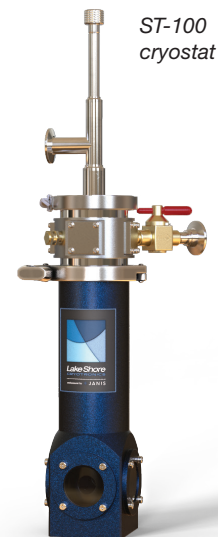
Reservoir cryostats

The SuperVariTemp cryostat has long been a recognized standard in research labs and institutes around the world. Key features include sample in dynamic helium gas, rapid sample exchange, long hold time, and excellent sample temperature stability. Other reservoir cryostat models include the VariTemp system, which is available in either static helium gas or vacuum sample environment.

Pourfill cryostats

The VPF sample-in-vacuum cryostat is an economical, variable-temperature liquid nitrogen-cooled system, with models covering the temperature range from 65 K to 800 K. VPF cryostats are simple to operate, and standard models offer $f = 1$ optics. A compact tail extension is available for use with electromagnets, and a built-in sample manipulator can also be incorporated for use with FTIR spectrometers.

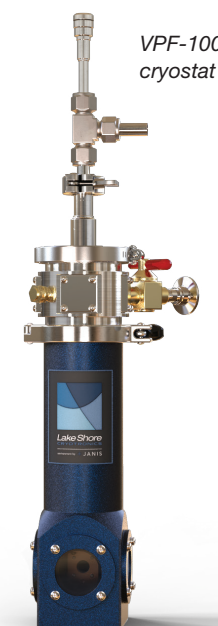
The VNF sample-in-flowing-vapor cryostat is ideal for liquid or powder samples, which are difficult to thermally anchor in a conventional cold finger cryostat. The top-loading sample positioner permits quick sample change without warming the cryostat. Like the VPF cryostat, the VNF can be equipped with compact tails for use with narrow gap magnets.



ST-100
cryostat



SVT-200
cryostat



VPF-100
cryostat

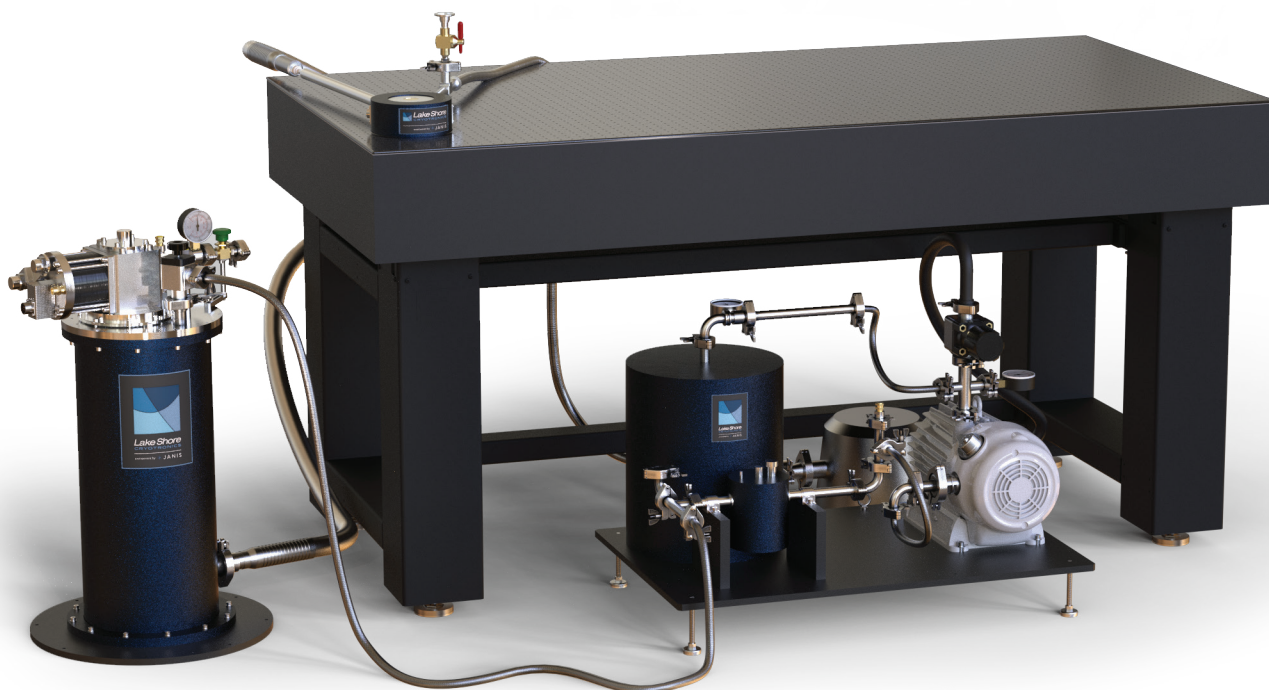
Recirculating gas coolers

The SuperTran product line has long been an industry standard for continuous-flow cryogenic systems. Now, with the introduction of the RGC4 recirculating gas coolers, these cryostats can be cooled without the need for liquid cryogenics.

A closed loop of helium gas is cooled by a cryocooler and the cold helium gas travels to the cryostat through a flexible vacuum-insulated transfer line. The gas cools the sample mount and thermal radiation shield before returning to the cryocooler for continuous recirculation. Samples can be changed without warming up the RGC4, allowing fast turnaround times. When paired with a Lake Shore Cryotronics ST-500 cryostat, the combination is an ultra-stable cryogenic microscopy platform, cooling samples and devices to below 4 K without the use of liquid helium.

Typical applications include micro-PL, micro-Raman, and high spatial resolution imaging. The RGC4 system can be used with the ST-100 optical workhorse, the ST-200 non-optical system, the ST-300 compact unit for use in a magnet, and the ST-400 UHV configuration, as well as the ST-500 microscopy configuration, the ST-500 based probe station, and the STVP with sample in flowing vapor.

- All the flexibility and convenience of a continuous-flow cryostat without liquid helium
- Fast sample change without warming up the RGC4 cooler
- Excellent thermal performance
- Low vibration — vibration data available upon request
- Compatible with most existing SuperTran cryostats
- Order a new cryostat with a transfer line and choose to operate using LN_2 , LHe, or cryogen-free



Superconducting magnet systems

These systems feature designs that fully integrate the cryostat, magnet, automatic temperature controller, and magnet power supply, complemented by a complete line of ancillary equipment. Our renowned SuperVariMag, OptiMag, and SuperOptiMag systems offer temperatures between 1.5 K and 325 K (with options to 475 K or higher) and can be supplied with or without optical access.

Magnet system designs include:

- Cryogen-free DryMag system with vertical, horizontal, or vector field configuration
- Standard top-loading systems with samples in helium vapor
- Systems for x-ray and gamma ray diffraction
- Room temperature (vertical and horizontal) bore systems



Custom cryogenic systems

From our earliest days, we have been committed to the design and supply of custom cryogenic systems to support the specialized needs of the low-temperature community. With in-house engineering analysis, computer-optimized designs, and comprehensive manufacturing capabilities, our experienced physicists and engineers are available to discuss your special requirements for nearly any type of cryogenic application. Typical examples of custom-engineered projects include:

- Ultra-high vacuum cryostats and superconducting magnet systems for scanning probe, atomic force, and scanning tunneling microscopes
- Ultra-low loss cryostats and continuous transfer systems for operation at very low (nanometer) vibration levels
- Cryogenic cold traps with single or multiple chambers for adsorption of noble gases from geological samples, or various oxygen isotopes from meteorites and polar ice caps
- Cryostats for neutron or x-ray beam lines with or without superconducting magnets
- Ruggedized cryostats designed for space shuttle micro-gravity experiments in superfluid helium

New and enhanced systems are continuously under active design and construction. Please contact us with your requirements.

Cryogenic lab accessories

Lake Shore stocks a full range of accessories and spare parts for all your cryogenic needs. We can supply a complete cryogenic system that is fully integrated and tested, thus avoiding compatibility problems when the system reaches your lab.

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| ■ Flexible helium transfer lines | ■ Mechanical pumping stations |
| ■ Continuous flow cryostat transfer lines | ■ High vacuum pumping stations |
| ■ Liquid helium storage Dewars and accessories | ■ Temperature controllers |
| ■ Liquid nitrogen storage Dewars | ■ LHe and LN ₂ level indicators |
| | ■ Cryostat accessories |

Environment by Janis products are used in a large variety of applications:

Aerospace and astronomy	Microphotoluminescence
Angular resolution photoemission spectroscopy (ARPES)	Micro-Raman spectroscopy
Cryogenic gas trapping	Micro-spectroscopy techniques
Deep level transient spectroscopy (DLTS)	Microscopy
Diamond anvil cell studies	Mössbauer spectroscopy
Electron spin resonance (ESR) spectroscopy	Nanoscale technology
Fourier transform infrared (FTIR) spectroscopy	Narrow-gap magnet
Hall studies	Neutron scattering
High-Tc	NMR spectroscopy
Ion source cooling	Optoelectrics effect
Large sample volume (4 K cryostats)	Photoluminescence
Large sample volume (10 K systems)	Raman spectroscopy
Magnetoresistivity	Ultra-high vacuum (UHV)
Material characterization	Vibrating sample magnetometry (VSM)
Material deposition	Vibration-isolated systems
Matrix isolation	X-ray diffraction

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