

NEW PRODUCTS

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LAWRENCE G. RUBIN

FOCUS ON CRYOGENICS

High-Temperature, Closed-Cycle Refrigerator

Advanced Research Systems has announced a high-temperature version of the Displex closed-cycle system for cryogenic research. The new Displex is said to provide a higher capacity and wider temperature range than any other closed-cycle cryogenic system. The high-temperature interface can easily be incorporated into optical cryostats and ultrahigh vacuum, low vibration, and magnet systems. The physical geometry of the new Displex allows compatibility when upgrading the company's existing systems to the higher temperature regime. The new model comes with an integral thermal switch and appropriate heaters and sensors to provide accurate temperature control and monitoring from 7 to 800 K, with a typical temperature accuracy of ± 0.05 K. The Displex has been used for x-ray diffraction, photoluminescence, spectroscopy, and surface science, where the sample can be heated to over 1000 K with an independent heater and power supply. *Advanced Research Systems Inc., 905 Harrison Street, Suite 109, Allentown, Pennsylvania 18103*

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Two-Stage Joule-Thomson Refrigerator

MMR Technologies' two-stage Joule-Thomson refrigerator can be retrofitted into the company's cryogenic cooling systems to extend their temperature range down to 30 K and up to 400 K, with a cooling capacity of 50 mW at 35 K. When used with the MMR electronic temperature controller, the two-stage cooler enables temperatures to be set with an accuracy of ± 0.5 K and a stability of ± 0.05 K or better. Cool-down and warm-up cycles require less than 25 minutes. Initial operating gas requirements are nitrogen and neon gas, each at 1800 psi.

The two-stage cooler occupies virtu-



ally the same space and volume as the single-stage MMR refrigerator and fits wherever the company's model R2205 or R2400 is used. Applications include characterization of the properties of materials and testing of integrated circuit designs over wide temperature ranges. *MMR Technologies Inc., 1400 North Shoreline Boulevard, Suite A-5, Mountain View, California 94043*

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Cryogenic Probe for NMR

Bruker has introduced the Cryoprobe, said to be the first nuclear magnetic resonance (NMR) triple-resonance inverse cryogenic probe for structural genomics and proteomics. It operates in the 20–30 K temperature range and provides a signal-to-noise improvement over conventional high-field biological NMR probes by a factor of 3–4, with a corresponding increase in throughput by a factor of 9–16. The CryoProbe is a 5 mm 500 MHz inverse probe for proton detection, with simultaneous ^{13}C and ^{15}N decoupling. It also has a deuterium lock and an actively shielded z-gradient, and it permits deuterium decoupling of deuterated proteins, and spin-lock pulse sequence elements used in several modern NMR methods. It can work with existing NMR spectrometers with actively

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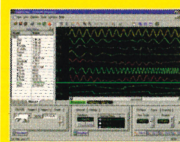


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shielded magnets, and does not require new NMR pulse sequence or methods. The CryoProbe comes with the company's CryoPlatform cooling and control unit for automated operation. *Bruker Instruments Inc, 44 Manning Road, Billerica, Massachusetts 01821*
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Variable-Temperature Cryostat

The Kel-Tran VT is a variable-temperature cryostat from American Superconductor. The 3 or 5 liter onboard supply of liquid helium provides eight or twelve hours, respectively, of continuous testing at 1.4 K. The system allows the sample to be placed directly in helium vapor, resulting in high heat removal with minimal thermal gradients within the sample. A quick disconnect flange on the sample tube allows rapid sample changing without breaking vacuum or warming the cryostat. Two independent variable-temperature heaters provide both coarse and fine temperature control, for maintaining system stability.

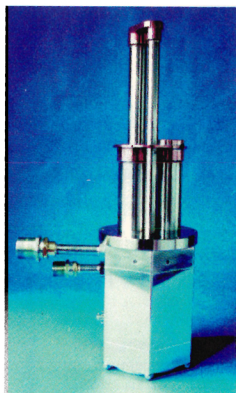
High-temperature models are available with upper limits of 700 K. Applications include materials research, spectroscopy, and magnet inserts. *American Superconductor Corp, Two Technology Drive, Westborough, Massachusetts 01581.*

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Two-Stage Pulse Tube Refrigerator

Cryomech's PT4-05 is said to be the world's first two-stage 4K pulse tube cryorefrigerator. The refrigerator has no moving displacers, a feature that reduces the mechanical vibrations to below 1×10^{-3} g while increasing the reliability and the meantime between maintenance—expected to be >20 000 hours—because there are no displacer seals that wear out. The PT4-05 simultaneously provides 0.55 W at 4.2 K on

the second stage and 1.8 W at 65 K on the first stage for 5 kW of input power; the no-load temperature is <2.8 K. Cryomech will also be offering two new products based on the PT4-05: a low-vibration 3 K cryostat and a 5 liter/day liquid helium plant. The cryorefrigerator should find applications in the superconducting



and cryoelectronics industries. *Cryomech Inc, 113 Falso Drive, Syracuse, New York 13211*

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Differential Scanning Calorimeter with Cooler

Shimadzu Scientific has introduced the automated DSC-60A differential scanning calorimeter, which features a 24-place autosampler and built-in liquid nitrogen cooling reservoir. The temperature range of the calorimeter is -130 to 600 °C, with a variably selected heating and cooling rate of 0.1 to 99.9 °C per minute or per hour. Using liquid nitrogen as the coolant enables cool-down from 600 to 40 °C in less than 6 minutes. The system provides easy selection of purge, drying, and cleaning functions, including a convenient detector cleaning sequence. New samples can easily be inserted by interrupting the automatic analysis mode; after completion of the new sample's analysis, the system can return to the automatic mode. All samples are inserted with the built-in tweezers.

The company's TA-60WS workstation provides data collection analysis and reporting. Test and report formats are stored as templates, and report printing can be automated. The workstation interface can be used to link up to four of the company's thermal analysis instruments. *Shimadzu Scientific Instruments Inc, 7102 Riverwood Drive, Columbia, Maryland 21046*

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Cryogenic Storage Freezers

Harris's Cryostar storage freezers offer cryogenic temperature performance with the convenience of chlorofluorocarbon-free mechanical refrigeration and without the use of liquid nitrogen. The freezers use a single-compressor refrigeration system to achieve and maintain uniform temperatures—namely -140 °C (model QCX10140) and -150 °C (model QCX7150)—at all shelf levels. The QCX10140 has a capacity of 292 cubic liters, the QCX7150 195 l³. All samples are maintained below the critical -130 °C glass transition temperature.

The freezers come with a full complement of control and safety systems, including set point and alarm parameters adjustable in 1 °C increments, extreme ambient alert, silent witness alert, and set point security. *Harris Manufacturing Co, 275 Aiken Road, Asheville, North Carolina 28804*

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Cryogenic Motors

Empire Magnetics offers stepper motors and brushless resolvers that operate at temperatures as low as 20 K. They feature special cryogenic dry lubrication and chromium-nickel steel alloy components, all selected for compatible thermal expansion characteristics and resistance to brittleness. The stepper motors are available in sizes ranging from a nominal outer diameter of 1.1 in (torque range of 0.5 to 2.5 oz-in) to 6.5 in diameter (torque range of 1600 to 8000 oz-in). The EMR 57 stand-alone resolver operates with an excitation of 4 V rms at 5000 Hz, a transformation ratio of 0.5:1, and an output voltage of 2 V rms. *Empire Magnetics Inc, 5780-B LaBath Avenue, Rohnert Park, California 94928*

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Thermoelectric Liquid Chiller

Melcor has released the MLA270, a closed-loop, 270 W solid-state thermoelectric recirculating liquid chiller, suit-



able for laser cooling, process liquids, medical equipment, and scientific instruments; it operates in the 2–40 °C temperature range. The cooler uses the Peltier effect and is constructed from a series of *p*- and *n*-doped semiconductor materials sandwiched between ceramic plates; the ceramic material adds rigidity and the necessary electrical insulation. Standard features include a pump, reservoir, low-fluid-level detector, and a built-in digital temperature controller that will stabilize liquid temperature to ± 2 °F. The controller also features high- and low-temperature alarms. The MLA270 uses water or a coolant solution and is said to offer a variety of benefits over traditional compressor-based chillers that use chlo-

rofluorocarbons. *Melcor Corp, 1040 Spruce Street, Trenton, New Jersey 08648*
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Nanometer Positioning Stage

The NPS-X-15A closed-loop X stage from Queensgate Instruments offers a $>15 \mu\text{m}$ range with subnanometer reproducibility. The company's piezo-flexure combination gives a pure motion of the stage with parasitic motions of typically less than 0.05 microradians. Closed-loop operation is provided by integral capacitive sensors, providing accurate and low-noise position measurement for the servo controller (typically 0.05 nm rms). The high stiffness of the stage results in a slow roll-off in resonant frequency with increasing load.

When combined with Queensgate's NPS-3000 series digital controller, the system provides greater than 0.05 nm resolution for $15 \mu\text{m}$ travel, with linearity of motion of better than 0.01% and hysteresis of better than 0.01%. Standard software control allows calibration of the stage *in situ* for most combinations of masses and velocities. The system should be useful for high-bandwidth nanopositioning applications, such as magnetoresistance and giant magnetoresistance head spinstands. *Queensgate Instruments Inc, Suite 600, 90 Merrick Avenue, East Meadow, New York 11554*

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New Literature

A catalog from Alcatel lists the company's CRYOFLEX transfer lines for liquid gases, including fabrication, dimensions, and technical data for standard and special flexible and rigid lines. There are also descriptions of terminations, couplings, bends, and joints. *ELTECH Technology Inc, 7 Woodland Avenue, Larchmont, New York 10538*
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Matheson's 32-page guide to gas regulators describes how a regulator works and compares the features of dual-stage versus single-stage regulators. It also provides advice on choosing regulators. Included are descriptions of the company's specialty products for corrosive, high- and low-pressure, high-flow, back-pressure, and low-dead-volume applications. *Matheson Gas Products, 166 Keystone Drive, Montgomeryville, Pennsylvania 18936* ■

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