

NEW PRODUCTS

Focus on cryogenics, vacuum, materials, and semiconductors

The descriptions of the new products listed in this section are based on information supplied to us by the manufacturers. PHYSICS TODAY can assume no responsibility for their accuracy. For more information about a particular product, visit the website at the end of its description. Please send all new product submissions to ptpub@aip.org.

Andreas Mandelis



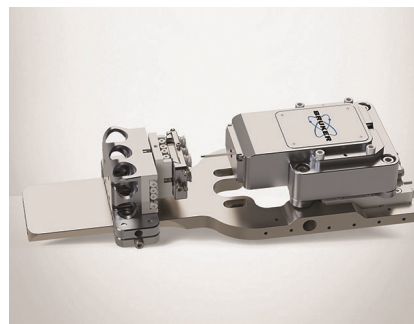
Compact, quiet vacuum pumps

Leybold has expanded its Ecodry Plus product family of dry multistage Roots vacuum pumps for laboratory, R&D, and analytical applications. The compact Ecodry 25 Plus and 35 Plus, which achieve high pumping speeds with relatively little footprint, complete the company's range of low-maintenance, economical fore-vacuum pumps.

They are also particularly quiet, with a noise level of 52 dB(A). The Ecodry 25 Plus and 35 Plus emit neither oil vapor nor particles, which is important in research institutes and laboratories where a clean working environment is essential. The pumps are equipped with an integrated pump controller and are suitable for all voltage ranges. Users can also connect a pressure gauge directly to the vacuum pump and adapt the pump's performance to specific requirements, which can potentially make it more energy efficient. **Leybold GmbH**, Bonner Str 498, 50968 Cologne, Germany, www.leybold.com

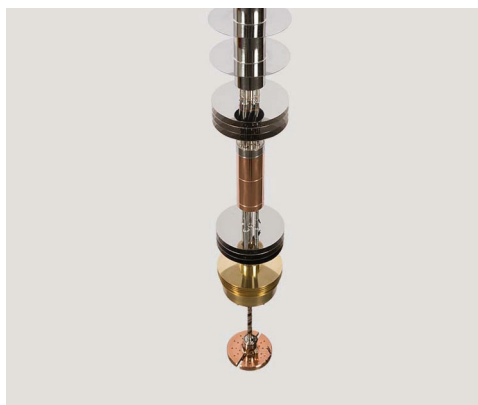
Leak detectors

Busch Vacuum Solutions has unveiled two leak detectors suitable for testing the tightness of vacuum systems and individual vacuum components, locating possible leaks, and quantifying their leakage rate. The smaller TAPIR HL 1102 A is for mobile applications, and the larger, multipurpose TAPIR HL 2216 A is for stationary applications. Both operate with helium or hydrogen as a tracer gas and can detect leaks with a leakage rate of up to 5×10^{-13} Pa m³/s, depending on the test method used. Two methods are possible with the TAPIR HL leak detectors. The spray test, in which the tracer gas is sprayed onto the surface of a component under vacuum, has the highest sensitivity. The sniffing leak detection method, in which a vacuum component is pressurized with the tracer gas, reveals the exact location of the leak. **Busch LLC**, 516 Viking Dr, Virginia Beach, VA 23452, www.buschvacuum.com



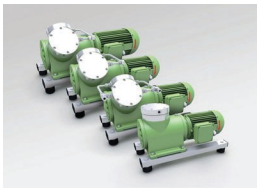
Nanomechanical SEM materials analysis *in situ*

Bruker Nanomechanical Testing designed its Hysitron PI 89 SEM PicoIndenter to expand understanding of the deformation mechanisms of high-strength materials. According to the company, the device provides a scanning electron microscope (SEM) with nanomechanical testing capabilities at higher loads and in more extreme environments than previously possible. Combined with novel capacitive transducer and intrinsic displacement technologies, Bruker's high-performance controller enables wide force and displacement ranges. The versatile tool also features an electrical characterization module and two rotation and tilt stage configurations, among other capabilities. It is suitable for use in such areas as accelerated mechanical property mapping, fatigue testing, and nanotribology. For analytical imaging, it is compatible with electron backscattered, convergent beam, and transmission Kikuchi diffraction detectors and with energy-dispersive and scanning transmission electron microscopy detectors. **Bruker Nano Surfaces Division**, 3400 E Britannia Dr, Ste 150, Tucson, AZ 85706, www.bruker.com



Cryostat with fast cool-down times

The Dry Ice 1.5K 100 mm closed-loop cryostat from ICE Oxford lets users carry out experiments in the 1.3–325 K temperature range. It ensures tight tolerance on temperature stability (± 10 mK below 10 K), fast cool-down times (less than 30 min to 1.4 K), and minimal vibration in the sample space (as little as ± 100 nm). The option exists to add helium-3 and dilution-fridge inserts to achieve even lower temperatures—300 mK and 15 mK, respectively. According to the company, the large 100-mm-diameter sample space and the cryostat's high cooling power of greater than 30 mW at 1.75 K are the best available for a variable-temperature-insert cryostat. Variants are offered with 30-, 50-, or 70-mm-diameter sample spaces. Using LabVIEW-based software, the cryostat can be highly automated to reduce system setup and turnaround time. **ICE Oxford**, Ave 4, Station Lane, Witney, Oxford OX28 4BN, UK, www.iceoxford.com



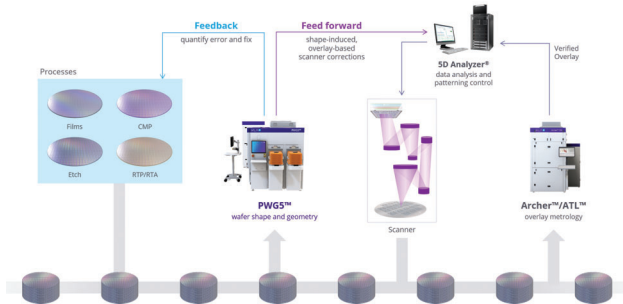
Diaphragm pumps for vacuum and compressor use

KNF's N 630 diaphragm vacuum/compressor pump series delivers high pressure and gas tightness. It offers vacuum down to 0.74 inHg (25 mbar abs), positive pressure up to 174 psig (12 bar rel), and a flow rate up to 2.4 cfm (68 L/min). Four models of the N 630 pumps are available: one- or two-headed and connected in series or parallel; each can be used as either a vacuum pump or a compressor.

To ensure durability, all models come with long-lasting diaphragms coated with ethylene propylene diene monomer rubber or chemically resistant polytetrafluoroethylene. The N 630 series handles ambient and media temperatures down to 5 °C and, because of head water-cooling systems, up to 60 °C. The pumps are suitable for use in industrial coolant systems, gas recycling, gas and emissions measurement and analysis, and leak detection in applications ranging from chemical processing and energy to physics research. **KNF Neuberger Inc**, 2 Black Forest Rd, Trenton, NJ 08691-1810, <https://knf.com>

Patterned semiconductor wafer metrology

The PWG5 patterned wafer geometry system from KLA addresses difficult issues in the manufacture of leading-edge memory and logic integrated circuits. The most capable flash memory is built in an architecture called 3D NAND constructed of 128 thin layers. Manufacturing those structures requires depositing hundreds of thin films of multiple materials and then creating memory cells by etching and filling holes several microns deep and one-hundredth of a micron across. As the film stacks grow higher, they can distort the surface planarity of the wafer and ultimately affect device performance and yield. To identify and correct patterned wafer distortion at the source, the PWG5 metrology system can measure minute distortions of the wafer's geometry on the front and back sides simultaneously. According to the company, the system accomplishes that with inline speed and exceptional resolution that support not only 3D NAND but also advanced dynamic random-access memory and logic applications. **KLA Corporation**, Three Technology Dr, Milpitas, CA 95035, www.kla-tencor.com



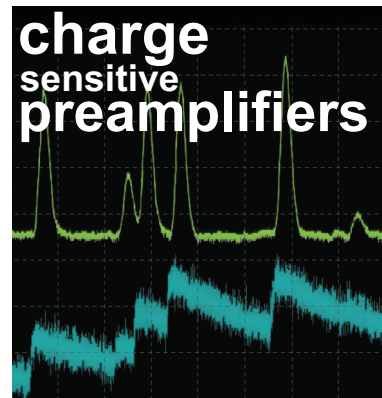
Capacitance diaphragm gauge

InstruTech's CDM900 Micro Bee capacitance diaphragm vacuum gauge has a ceramic sensor and a cost-effective design. According to the company, the temperature-compensated CDM900 provides highly accurate pressure measurements with full-scale ranges of 10–1000 torr. Pressure measurement is independent of gas type. Models are available with 0.5% and 1% of reading accuracy and with various fittings, including ½-inch tube (O-ring compression), NW16KF, NW25KF, and 1½-inch Mini-Conflat types. No span adjustment is required, and in clean applications, no zero adjustment

is needed. The CDM900 provides 0–10 V_{dc} linear analog output. It does not require a controller to operate; it provides an analog output signal that can be directly interfaced with users' control systems. The company's AGC302 controller can be used for panel- or rack-mount-display installation and when setpoint relays or serial communications are required. **InstruTech**, 1475 S Fordham St, Longmont, CO 80503, www.instrutechinc.com

Gifford-McMahon cryocoolers

ULVAC Cryogenics—a joint venture of Japan-based ULVAC and US-based Helix Technology Corporation, currently doing business as Edwards Vacuum—has upgraded its Gifford-McMahon cryocooler product line so researchers and industrial users can select the system best suited to their need for second-stage wattage. Three new 4 K models are offered: the UHE10F (1.0 W at 4.2 K), the UHE12F (1.25 W at 4.2 K), and the UHE15F (1.5 W at 4.2 K). The cryocoolers feature high cooling capacities and are orientation-free and UL/CE certified. **ULVAC Cryogenics Inc**, 1222-1 Yabata, Chigasaki, Kanagawa, 253-0085, Japan, www.ulvac-cryo.com



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NEW PRODUCTS

Fast-setting two-component epoxy

When the white and black parts of Master Bond's EP51CC color-coded epoxy are combined, they form a uniform gray paste that indicates proper mixing. The nondrip compound is electrically insulative and suitable for bonding and sealing applications. It sets up quickly at room temperature, with a working life of 3–5 min for a mixed 50 g batch. The exact fixture time can vary from a few minutes to several hours, depending on various factors. Those include curing temperature, component size, substrates being bonded, and amount of adhesive applied. The cure schedule plays a role in bond strength. For example, when cured at room temperature for 24 h, EP51CC offers a lap shear strength of 700–800 psi; cured at room temperature for 8 h followed by 3 h at 250 °F, its strength increases to 2300–2500 psi. The epoxy bonds to various substrates, including metals, composites, glass, ceramics, vulcanized rubbers, and many plastics. Formulated for temperatures from –452 °F to 250 °F, EP51CC is also suitable for challenging cryogenic applications. **Master Bond Inc**, 154 Hobart St, Hackensack, NJ 07601-3922, www.masterbond.com



NEW LITERATURE



Hall effect measurement handbook

Lake Shore Cryotronics's 88-page *Hall Effect Measurement Handbook: A Fundamental Tool for Semiconductor Material Characterization* is a comprehensive resource for both new and experienced materials researchers. Written by Jeffrey Lindemuth, the handbook covers topics such as the theory of Hall effect measurements; how to measure the resistivity and Hall coefficient of materials; the major sources of measurement errors, both intrinsic and geometric; and ways to minimize the effects of those errors. The handbook is available both electronically and in print. US and Canadian customers can receive a print copy by mail at no charge. **Lake Shore Cryotronics Inc**, 575 McCorkle Blvd, Westerville, OH 43082, www.lakeshore.com **PT**

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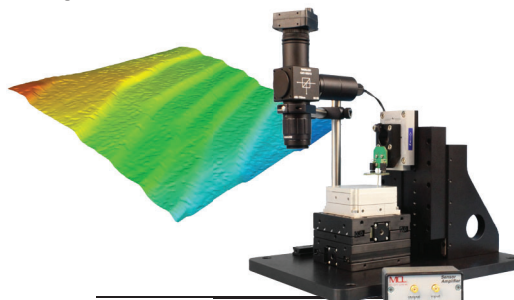
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