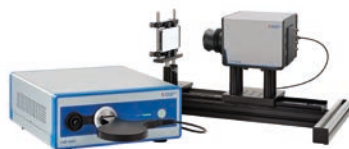


## Display testing at high and low luminance levels

**Manufacturer:** Instrument Systems.

**Product:** New “LumiTop X20” and “LumiTop X30” imaging colorimeters especially for display production testing under special luminance conditions. They feature high camera resolution (20 MP and 31 MP respectively) and improved dynamic range from  $10^{-3}$  to  $10^6$  cd/m<sup>2</sup>.

**Background:** The human eye adapts easily to dark and bright lighting conditions. Modern displays take this into account by dimming their display to low luminance. When designing and manufacturing displays, the luminance and color of the display must therefore be accurately tested, even at low luminance (typically, at luminance levels ranging from 0.001 cd/m<sup>2</sup> to 0.1 cd/m<sup>2</sup>).



**Features:** Both cameras are based on the spectrally optimized “LumiTop” principle, the fastest, most reliable and most accurate system which has become the reference for high performance testing in display production. The unique combination of a high-resolution camera, a flicker photodiode and extremely accurate spec-

troradiometer of the “CAS” series makes the system an exceptionally powerful tool for display testing. Display manufacturers are able to perform tests at very high luminance in the range of several Mcd/m<sup>2</sup> as well as low luminance in the range of 0.001 cd/m<sup>2</sup> to 0.1 cd/m<sup>2</sup>, taking into account the adaptation of the human eye to dark and bright lighting conditions.

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## Optical frequency combs in the mid-infrared

**Manufacturer:** Menlo Systems.

**Product:** Mid-IR Comb optical frequency comb system “Mid-IR Comb” series for precision metrology into the mid-infrared spectral range.

**Features:** The “Mid-IR Comb 3-5” and “Mid-IR Comb 5-8-14” models allow precision metrology into the 3 – 14  $\mu$ m mid-infrared spectral range. The turn-key all-in-one system is based on a Menlo Systems’ robust and reliable “figure 9” fiber mode-locked oscillator technology and difference frequency generation (DFG). The resulting carrier-envelope-offset (CEO)-free optical frequency comb can cover the spectral ranges of 3 – 5  $\mu$ m, 5 – 8  $\mu$ m, or 8 – 14  $\mu$ m, determined by the customer, and provides up to 200 mW average optical power within a large spectral bandwidth of 50 to

300 cm<sup>-1</sup>. Optionally, the frequency comb can be equipped with a CEO-actuator for stabilization to an RF or optical reference, in order to obtain comb lines featuring Hz-level linewidths in the mid-IR.

**Applications:** The Mid-IR frequency comb is a reliable enabling tool for molecular analysis and materials science. The so-called molecular fingerprint region allows for the unambiguous characterization of molecular signatures, providing insights into the chemical composition and reaction kinetics of organic or inorganic materials. The series enables high-sensitivity and high-accuracy measurements, such as mid-IR Fourier-transform spectroscopy (FTIR), nano-FTIR, mid-IR dual-comb spectroscopy, or frequency-locking of mid-IR quantum cascade lasers.



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## Fully integrated laser module with multiple outputs

**Manufacturer:** Vortran.

**Distribution:** Frankfurt Laser Company.

**Product:** Fully integrated laser module “VersaLase” with multiple outputs for different wavelengths with analog or digital modulation. The module is designed for medical, biomedical, and industrial laser applications.

**Features:** The plug-and-play unit offers outputs of up to four different wavelengths and is specifically designed for the requirements of applications in the UV, visible to

near IR range. The integrated, patented, CDRH-compliant laser units feature a sealed optical resonator and innovative electronics. The module offers unmatched performance stability, excellent beam quality, high pointing stability, and very low noise. With the user interface developed by Vortran, users can individually control and monitor each wavelength via USB or RS-232.

The Frankfurt Laser Company’s sales and engineering team is ready to assist cus-

tomers in selecting the appropriate configuration for their specific applications. Custom OEM customizations, which are not currently offered as standard, can also be realized upon request.

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## Optical seam sensor for automated welding

**Manufacturer:** Scansonic

**Product:** New model 'TH6D-Advanced' in the product family of optical seam sensors with extremely powerful image processing and scalable pattern recognition algorithms. The sensor is suitable for applications in automated arc or laser welding processes, as well as for automated gluing or other processes where precise and reliable guidance along a defined geometry is required.

**Features:** The basis of image processing in the new sensor is the proven triangulation principle. Components and various joints are detected by combining laser beams, a powerful camera and an optical system. The sensor detects all common seam shapes and can be used for all materials that can be joined or separated, such as steel, stainless steel, aluminum, plastics or wood. The supplied software is quickly installed and extremely user-friendly. The customer can easily adapt it to his own individual processes and specific seam geometry. The permanent tuning

eliminates the need for time-consuming re-teaching when changing parts or if there are changes in the edge. Thanks to its robust design, the new system works even under conditions of highly automated series production. It is insensitive to the influence of electrical interference. The housing is splash-proof and features an integrated protective glass rinsing system and a protective glass quick-change unit. An integrated air cooling system ensures constant temperatures. This makes the new system ideal for both small and medium-sized companies that want to automate their joining processes or improve existing ones.

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## All-in-one tristimulus-filtered imaging spectral colorimeter

**Manufacturer:** Westboro Photonics

**Distribution:** SphereOptics

**Product:** Cutting-edge 'WP525' imaging spectral colorimeter, an all-in-one solution for superior color measurements of displays, graphics, and lighting in research, development, and production.

**Features:** The innovative instrument integrates a high resolution 24.6 MP tristimulus-filtered imaging colorimeter with a high-accuracy reference spot spectroradiometer. Designed to streamline color and luminance measurements, the device eliminates the need for multiple discrete instruments. Its unique design, coupled with precision mechanics, ensures swift

and automatic color corrections, offering high performance and unmatched flexibility in R&D or production testing of displays, graphics, and lighting.

At the heart of the device lies a high speed linear translation stage, enabling rapid and precise switching between optical paths. This component facilitates seamless transition between spectroradiometer measurements and tristimulus-filtered imaging for automated corrections of color measurements. In addition, this feature conveniently enables fully automated shuttering and dark measurements to correct detector noise, without affecting the measurement time. With thirteen interchangeable lenses,

including specialized options like a conoscopic lens for viewing-angle testing and a near-to-eye-display lens for AR/VR analysis, the device offers high adaptability to various applications. The intuitive 'Photometrica' software and optional application-specific add-ons provide comprehensive and fully automatable analysis tools.

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## Turbo pumping station for demanding HV and UHV applications

**Manufacturer:** Pfeiffer Vacuum.

**Product:** New turbo pumping station “HiCube Neo” with pumping speeds ranging from 80 to 800 l/s, for applications in industry and research & development. It unites offers intuitive control and unites high reliability and energy efficiency.

**Features:** . The versatile pumping station adapts to requirements from a compact desktop solution to a standalone unit. Thanks to its plug-and-play concept, it is ready for use straight away. Its strengths lie in its advanced functions and user-oriented design. The intuitively operated 7"-inch touch screen, remote control via a web server and detailed data recording are just some of the features that make it exceptionally user-friendly and efficient. Its open design facilitates maintenance and allows easier access to the components. The backing pump's energy-efficient standby mode



also reduces energy use and cuts operating costs as a result.

The “HiCube Neo” can be prepared for wide-ranging applications with an array of different backing pumps such as diaphragm, rotary vane, scroll and multi-stage Roots pumps. Typical uses range from analyzing gases and calibrating vacuum gauges to pumping down cryostats and use in vacuum furnaces.

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## Femtowatt photo receivers, an alternative to PMT and APD

**Manufacturer:** Femto Messtechnik

**Product:** Extremely low-noise photo receivers of the ‘FWPR-20’ series for the wavelength range from 320 nm to 1700 nm with 20 Hz bandwidth and integrated signal amplification up to  $10^{12}$  V/A

**Features:** The femtowatt photoreceivers combine large-area Si-PIN or InGaAs-PIN photodiodes with extremely low-noise transimpedance amplifiers. The NEP is only 0.7 fW/ $\sqrt{\text{Hz}}$  and enables direct measurement of optical power down to the femtowatt range with a digital voltmeter. In combination with a lock-in amplifier, modulated AC measurements down to the sub-femtowatt range can also be easily made. High quantum efficiency, robustness against optical overload and the compact design make these photo receivers a good alternative to photomultipliers (PMT), avalanche photodiodes (APD), or cooled germanium detectors in many applications. In non-time-critical applications with ac-

quisition times of more than 100 ms, the photoreceivers even achieve better noise values than many APD receivers because the excess noise factor, which is unavoidable in APDs, does not occur.

The free space models with a 1.035"-40 thread (FST) are very versatile as they can be converted into a fiber-coupled version in no time.

**Applications:** Replacement of APDs, PMTs, or cooled Ge detectors in non-time-critical measurements. Measurement of extremely small optical powers in spectroscopy, electrophoresis, chromatography, fluorescence and much more.

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