

# PHOTONICS NEWS

Company Newspaper of the LASER COMPONENTS Nordic AB

[lasercomponents.se](http://lasercomponents.se)

#07 ■ 12|17

Machine Vision FLEXPOINT®

Differential Pyroelectric Detector

Automotive Qualification for Pulsed Laser Diodes

New Products



# Stereotyping

Dear Reader,

LASER COMPONENTS Nordic can look back at another great year, with several interesting projects coming to completion and many new ones just getting started. Photonics is such an amazing and expansive industry and today it is certainly one of the most fascinating areas to work in. LASER COMPONENTS is a key supplier to companies now moving photonics into ever more and more technology segments, turning what was once something people worked with in laboratories into every-day technology, present in every home. Our in-house capabilities make us very well positioned to follow, and even lead, the fast-moving development in our industry. More and more customers discover this and I invite you to do the same by bringing your components needs to us.

With that in mind, this new issue of Photonics News Nordic will show you something of the width and breadth that we can offer – from our own product portfolio! The articles will take you through several of our production sites and describe some of our core capabilities. That is, laser modules, laser optics, fiber optics, detectors, pulsed lasers, and more. We are very proud of our in-house development and of our production departments. As a customer, you will find that there is a huge advantage to having a single source with this many cross-disciplinary competencies. It allows us to see a bigger picture and to solve problems more efficiently. On the back page, you will also learn a few things about what it means to have the Design Center at LASER COMPONENTS supporting your project – just what is it that makes us unique?

Last, a big "Thank you!" to everyone that came visiting our booth at the exhibitions during the spring and autumn. It is always a great pleasure to meet you all and we are very happy to be a part of your projects. We look forward to meeting you again next year!

Yours,



Mikael Winters



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## Imprint

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2017 Edition

# MACHINE VISION FLEXPOINT®

FLEXPOINT® MV Serie

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## New Laser Modules for Industrial Image Processing

FLEXPOINT® MV - Edition 2017: Positioning and Measuring with Lasers

We are introducing the completely revised versions of the successful line laser series: MVfemto, MVPico, and MVnano. The MV18 series is entirely new: In these line lasers, an M18 thread is integrated on the module housing. Find out more about these new FLEXPOINT® MV modules:

**Focus mechanism.** The new focus mechanism allows easier operation, and the focus level can be precisely set. This new mechanism results in a higher beam pointing stability and a low drift in the line position.

**New Focus Options.** Choose between a variety of optics to obtain a suitable combination of line thickness and depth of focus: DLSE, DLE, DL, Standard, TS1, and TS2.

**Cos<sup>4</sup>-Correction.** The Cos<sup>4</sup> law describes the natural attenuation of light toward the edge during application of imaging optics. For applications with a large field of view (FOV), we correct the power distribution along the line: Increased power at the edge and decreased power in the middle of the laser line compensate the errors in the objective and lead to a homogeneous power distribution on the camera chip.

**Variations.** In addition to the standard version with an adjustable focus, these lasers are also available immediately in other variations:

- Cost-reduced version with a fixed focus
- Versions in which the optics and laser are separate from the electronics in order to integrate them into systems with a restricted amount of space
- MV modules without control electronics are available for integration in camera systems.

**Additional Options.** These lasers can be ordered in the future with an internal microcontroller and serial interface in order to make adjustments on your own or to readout operational conditions in the laser, such as, for example, the operating hours, temperature, and operating current.

As known from the preceding series, these lasers are available with various wavelengths: blue (405/450 nm), green (520 nm), red (635/660/685 nm), and NIR (785/830/850 nm). The output power levels extend to 100 mW, depending on the laser diode.

These lasers can be customized to comply with the eye-safety laser classes 1 and 2. Options such as digital modulation or analogous power settings complete the options available when placing an order. ■

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# FLEXPOINT® Laser Modules

## A Success Story Made in Germany

Many aspects of life would be unimaginable without laser modules. They are used, in particular, as pilot lasers, alignment aids, or in digital image processing. In modern Industry 4.0 control systems, they are an important component in the production processes of tomorrow.

We have been manufacturing laser modules under the FLEXPOINT® trademark since 1987. Our strength lies in the production of custom modules; in fact, we develop custom modules in individual pieces or in series production: You provide us with your specifications in terms of wavelength, beam profile, power level, housing, connection, and power distribution and we will customize your module.

### No Two Modules Are Alike

Our FLEXPOINT® laser modules are as individual as our customers' systems. We often modify existing products to meet very specific demands; in fact, we have a myriad of components and housings available in stock that we often simply have to recombine to create a new model.

### It is All a Matter of the Right Combination

Our R&D team consists of physicists and engineers from different fields who collaborate on the development of various products. Each team member brings his own knowhow to the table when analyzing customer demands.

Oftentimes the expert you need is just a door away. An active exchange of experience dominates in our meetings, which we hold regularly. In this atmosphere, we are able to find the right solution quickly, even for tricky issues.

Our developers use Solid Edge or Trace Pro software in the implementation of their ideas to simulate mechanics and beam guidance down to the smallest detail. We even develop the electronics in house and certify them as prototypes.

### Quality – More than Just a Promise

LASER COMPONENTS' FLEXPOINT® modules are quality products that rise significantly above the cheap, mass-produced products from the Far East.

A high standard of quality depends on many factors and begins with the selection of components. Our suppliers are subject to the same strict standards that we set for ourselves: we certify our suppliers' components using our own lifetime tests via the laser modules.



Our regional suppliers carry out series production of the components developed by us – electronics and mechanics. We profit, on the one hand, from the high standards of our engineering pool in Germany and, on the other hand, from the short communication lines that guarantee personal consultations and quick delivery, even of small quantities. There are several optoelectronics companies near our headquarters in Olching, with which we have enjoyed long-term partnerships. We track the product flow of all our components in house: we guarantee complete protection of all areas – from receiving to quality control to storage – against electrostatic discharges according to DIN EN 61340-5-1.

#### Extensive Testing

Our customers measure the quality of their modules based on long-term stability: we guarantee compliance with specifications throughout a long lifetime and test the durability of the entire system, which consists of a diode, electronics, and a housing. Each FLEXPOINT® model is subject to an accelerated lifetime test in which we allow the modules to age under various thermal conditions.

Of course, all FLEXPOINT®s are CE certified and comply with RoHS.

#### Certified Laser Classification

The reliable assignment of laser classes helps in the proper handling of modules and prevents harmful radiation damage. Therefore, we measure each new FLEXPOINT® model according to DIN EN 60825-1 and assign it to the appropriate laser class. To ensure that errors do not occur, we voluntarily have our measuring stations certified by external specialists on a regular basis. As radiation damage is a serious health issue, we take it very seriously: Our technical director is, therefore, also involved in the standardization committee on laser and electro-optical systems.

Our quality promise does not end with delivery. We assign each batch of FLEXPOINT® modules an individual identification number. This makes it possible to track the components used in the individual modules clearly and unambiguously. In the unlikely event that an error occurs, we are able to retrace the cause of the problem quickly and find a solution to resolve it.



FLEXPOINT® laser modules are produced at two locations in Germany. This task is exciting because the laser modules are so different. In addition, these products are constantly being further developed. Daily tasks are, therefore, in constant flux and measuring stations continually adapted.

#### Successful with High-End Products

“Made in Germany” is still a symbol of excellent engineering skill and high quality. This is the reason for the success of our FLEXPOINT® modules. In the high-tech industry, reliability, precision, and quality often carry more weight than the production of large quantities at low cost. In addition, we are familiar with the latest developments in the industry. As part of Industry 4.0, our products are able to be integrated into state-of-the-art control systems. The fundamentals of data communication and the control of key parameters are implemented in a digital laser controller. This is why companies specializing in medical technology, engineering, and the automobile industry rely on laser modules from LASER COMPONENTS. ■





# LARGE LASER OPTICS HIGH POWER

## Laser Optics for the Highest Possible Energy Densities

Everybody is familiar with the scene in Goldfinger in which the antagonist attempts to slice James Bond 007 in half with a laser beam. In 1964, this film was pure science fiction. Just one year earlier, the first CW laser had been developed – at a power level of approximately 1 mW. This is not even strong enough to cut through a sheet of paper.

Lasers in the kW range are now a part of everyday industrial life and would not fascinate people anymore at the movie theater. For research purposes, the first devices are in use with several hundred terawatts. However, neither welding lasers nor fusion reactors can function properly without proper optics. At high power levels and energy densities, the expectations are high.



# Optics for Lasers of the Future

## High Power Requires State-of-the-Art Coating Methods

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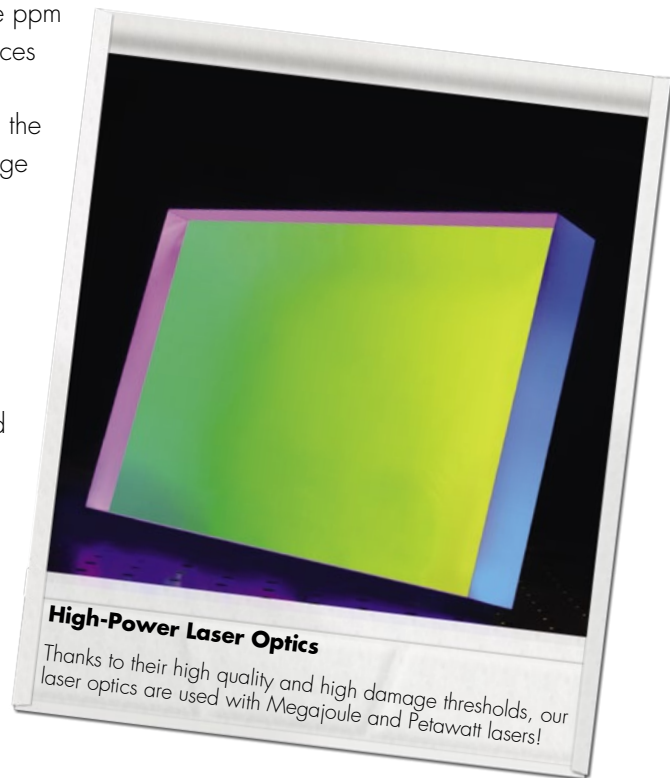
When the first lasers were developed almost 60 years ago, the power limits reached into the milliwatt range. Today, the optics industry uses continuous wave lasers that emit several kilowatts; in addition, research centers use enormous pulsed laser devices that emit several hundred terawatts. Contrary to the general trend toward miniaturization, laser optics are getting larger and larger at increasing output power levels. For optics manufacturers such as LASER COMPONENTS, there is great potential in precision optics with high damage thresholds.

Compared to other areas of application, absorption in the ppm range has serious consequences in high-power lasers: The absorbed light produces heat in the substrate and coating. Damage can occur because optical components do not conduct heat well. Temperature fluctuations can lead to the focal point "wandering" and no longer remaining in the processing plane. This is referred to as a thermal lens.

*Continue next page →*

### High laser output power requires low absorption of laser optics

The optics industry uses continuous wave (cw) lasers for welding and cutting. Producing the optics required for this purpose is a complex process because the high output power requires particularly robust components.



## Setting Standards in Committees and Research Projects

Our Clients Can be Sure to Get the Latest Technology

*"We use state-of-the-art plasma-assisted coating methods, actively participate in research projects, and set standards by partaking in the DIN Standards Committee."*

Our activities are diverse. We make sure to use state-of-the-art coating methods and produce dielectric coatings with high laser damage thresholds for high-power lasers.

We create custom designs using modern software tools. This software derives the layer sequence and then transfers it directly to the coater.

In addition to the electron beam method, we also use plasma-assisted methods that are characterized by low drift: This includes both ion beam sputtering (IBS) and plasma ion assisted deposition (PIAD). We are not only well equipped with coating chambers, with which we are able to implement all standard methods, but measurement technology is one of our strengths as well.

This makes it possible for us to ensure process safety: the coaters are fully automated and computer assisted, and the layer composition is monitored online during the coating process.

**PLUTO+ (FKZ 13N13208).** As part of PLUTO+, we check layer systems for 2.1  $\mu\text{m}$  and 2.9  $\mu\text{m}$ . We focus on the examination of plasma and its effect on coated substrates. This results in process-relevant plasma

parameters. Together with our partners, we are currently working on new process diagnostics and are testing innovative standard concepts for industrial coating processes.

**Nano-RuGIT (FKZ KF2638302NT4).** We are responsible for the design of next-generation pulse compression gratings, as well as the development, production, and measurement of coatings with a high laser damage threshold. We take new approaches to the designs created for PIAD and IBS. Together with our cooperation partners, we structure layer systems and test them with respect to their effect on short-pulse lasers.

**DIN Standards Committee.** Furthermore, our technical director, Dr. Lars Mechold, is a member of the DIN Standards Committee on precision mechanics and optics NA 027-01-18 AA. DIN is responsible for establishing and revising standards, for example, for the measurement of damage thresholds.



Dr. Lars Mechold, Technical Director

How the absorption affects the laser beam can be determined via the calorimetric measurement of the surface temperature or via a reference beam. The BWA-MON from our partner, Haas Laser Technologies, provides another possibility of monitoring the beam shape during operation.

What can you do to solve the problem of absorption? With substrates that are low in OH and an optimal coating selection, optics with very low absorption rates can be produced. The use of so-called TLC optics is relatively new. A method that has been used successfully for decades in infrared optics is here transferred to laser light.

### Optics for the largest lasers in the world

Nuclear fusion and cancer research require high-energy lasers in the megawatt and petawatt range that support science in making breakthroughs. There are a handful of gigantic facilities in use. The most well-known facility in Europe is most likely the Laser Mégajoule near Bordeaux. In 2014, the first of 22 beamlines went into operation. Another one will be added each year until 2025. The lasers used in these facilities break all records in terms of dimension with which we are familiar in the optics industry. This becomes apparent from the size of the building alone. Each of the four laser halls is 100 m long and 30 m wide. The number of components used is also immense: for complex beam guidance, for example, 10,000 optics are required in various sizes [1].

LASER COMPONENTS manufactures optics with diameters of up to 390 mm for these scientific institutions. To carry this out successfully, it is first necessary to select the right substrate and coating material. Not all substrates are low in absorption, suited for the desired sizes, and at the same time smooth enough.

The surface roughness may only be a few Ångström at the most, and the surface figure must range in the area of  $\lambda/10$ .

Furthermore, a coater is required that can handle large substrates and ensure highly homogeneous coatings even on large diameters. We check this regularly by taking distribution measurements.

### In good shape, even under pressure

In plasma-assisted processes, the packing density of the vapor-deposited coatings is particularly high. Depending on the diameter-to-thickness ratio of the substrates, this can lead to slight deformations in the substrates. It is possible to correct this effect by taking the proper measures: Either it is necessary to use an appropriately pre-bent substrate or to apply another coating to the backside of the substrate that reverses this effect.

### This Generates a Thin Beam

Both people and laser beams favor a small waist; however, its absence – or even just a small shift – can have a grave effect on the application of high-power lasers. Therefore, it is important to monitor the beam shape continually.

The BWA-MON from Haas Laser Technologies makes this possible; it determines important parameters, such as beam waist, beam size,  $M^2$ , and thermal lens, via a sample beam. At 50 Hz, the measurement principle is very fast, making several measurements per second possible. Real-time monitoring of the beam characteristics makes it possible to intervene actively to prevent deviations.

### A Clever Solution

Thermal lensing compensation (TLC) products take advantage of the physical properties of different substrate materials: In most substrates, the refractive index increases with the temperature; however, there are also materials available that behave inversely. A clever combination of optics that exhibit both properties in a single lens system makes up for the deviations caused by thermal lenses. The focal point remains the same under all environmental conditions.

It is crucial to have a production team that is experienced in practical applications and knows how to get the desired results.

### Experience and scientific curiosity

With our high-quality laser optics, we deliver practice-based solutions for the challenges of the present; however, LASER COMPONENTS also always has the future in mind: Together with industrial partners and renowned research institutes, we collaborate nationwide on developing the technologies and processes of tomorrow. This combination of development, production, experience, and research curiosity is the secret of our success at LASER COMPONENTS. It allows us to meet even the most complex technical requirements. It also provides us the security of tackling each new challenge: Our sales engineers and developers work closely with our customers on innovative solutions for applications of the future. ■

[1] <http://www-lmj.cea.fr/fr/installation/index.htm>







"Mode-strip connectors are designed for high-power lasers and were developed by us in house; they are currently part of production!"

WFB  
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The mode-strip connector developed by us in house contains a mode stripper, which literally strips the optical fiber of its cladding modes and conducts the generated heat away from the fiber via a cooling element. Our mode-strip assemblies prevent the thermal destruction of the fiber connector.

**Applications.** Optical fiber patch cords with mode-strip connectors are used in particular in the area of high power transmission (e.g., in laser material processing or in the optical pumping of fiber lasers via laser diodes).

Customers also inquire with us when they require high optical beam quality without cladding modes or when thermal hotspots must be avoided in the fiber cladding.

# MODE-STRIP ASSEMBLIES

## Fiber-Optic Assemblies

### Manufactured in Olching

LASER COMPONENTS has been manufacturing fiber-optic assemblies and patch cords for over 20 years. Our specialty is the assembly and processing of large-core fibers, such as those used in, for example, sensor technology, spectroscopy, and medical technology. Customizations are our standard. Our development engineers work hand in hand with the production team in order to accomplish complex tasks. Polishing methods from optical precision technology ensure the highest quality; this has been confirmed by reputable customers worldwide. In addition to various measurement and testing equipment for the assessment of output power, optical parameters, end faces, and stability, an in-house laser laboratory is also available.

### Our Fields of Work

**Laser Power Transmission.** One of our core competencies is the manufacturing of fiber-optic assemblies for laser power transmission. This field is dominated by SMA and D80 connectors, as well as custom coupler designs with large-core fibers ( $\varnothing_{\text{core}}$ : 100-1000  $\mu\text{m}$ ). We manufacture free-standing SMA connectors with centricities of the free-standing fiber of  $<5 \mu\text{m}$ .

To achieve maximum transmission capacity, we equip patch cords with an AR coating in house.

**Sensor Technology.** The triumph of miniaturization and flexibility in sensor technology requires new solutions in light transmission via optical fibers. In collaboration with our customers, we are able to expand the limits of possibility.

**Medical Technology.** We are certified via our management system according to ISO 13485. In a state-of-the-art cleanroom environment, we develop and manufacture medical fiber assemblies for applications in surgery, dentistry, dermatology, lithotripsy, tattoo removal, and magnetic resonance imaging.

**Spectroscopy.** Flexible fiber technology is also required in spectroscopy: either as single-fiber transmission or as a fiber bundle. The transmitted wavelengths that extend into the deep UV range are quite fascinating.

**Industrial Applications.** Fibers are increasingly being used in industry for data transmission, control, and light transmission. In addition to glass fibers, plastic optical fibers (POFs) are also in demand.

**Fiber-Optic Developments.** Our development and production teams at LASER COMPONENTS work hand in hand. This allows us to respond quickly to customer needs regarding the design, development, and production of submodules and modules and to also find solutions for complex requests and projects. ■



## Pyroelectric Detectors with Differential Amplifiers

First Choice for IR Applications – Signal-to-Noise Ratio Significantly Increased

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Pyroelectric detectors are designed for use in NDIR and FTIR spectroscopy, IR laser-based measurement technology, pyrometry, and flame and fire detection. There are many good reasons for the application of pyroelectric components: they are inexpensive, reliable, robust, and have, as thermal detectors, a high sensitivity from short to long IR wavelengths.

**LD2100 series with a differential amplifier.** Pyroelectric crystals generate positive and negative charge carriers simultaneously on opposing sides. The LD2100 series is the first series in which both crystal sides are amplified separately: the useful signals add up linearly, which means that they are doubled. The noise portions only add up statistically; altogether there is a net gain in the signal-to-noise ratio! Compared to the bestseller L2100 series, we were able to double the signal in the new LD2100 pyrodetector series – at the same time the noise was kept almost constant at a low level. The actual improvement of the signal-to-noise ratio is, therefore, significantly greater than the purely theoretical value of 1.4. More than that: External interference signals are eliminated by calculating the difference. These detectors can, therefore, be used in critical environments with electric fields. Furthermore, the LD2100 series make simple circuitry possible in which the signal output can be directly applied to the input of a differential AD converter. ■

Pyroelectric detectors with differential amplifiers.  
The differential output gives rise to noise cancellation benefits.

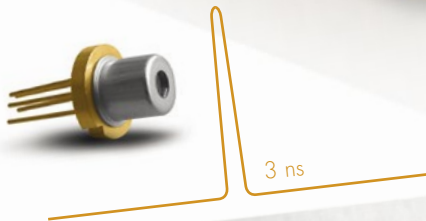
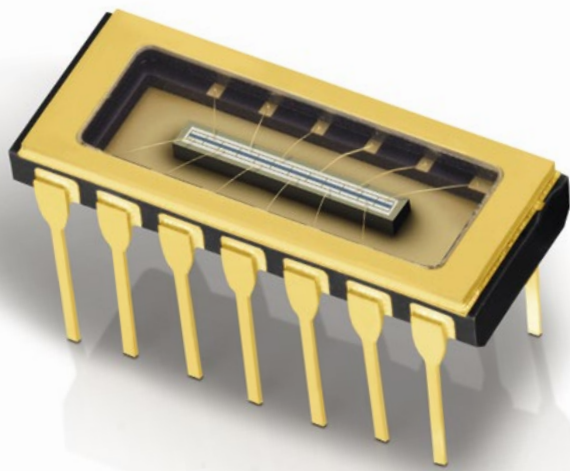
# DIFFERENTIAL PYROS



LASER COMPONENTS Pyro Group has developed and manufactured pyroelectric detectors in Stuart, Florida, U.S.A. since 2014. In the newly built production facility, pyroelectric detectors made of  $\text{LiTaO}_3$  and  $\text{DLATGS}$  are produced.



# APD PLD



## QuickSwitch PLD and APD Line Array

For autonomous driving or for room surveillance with laser scanners, innovative and reliable components are necessary.

## LASER COMPONENTS Detector Group

Our Avalanche Photodiodes are Developed and Manufactured in Tempe, Arizona.

WEB N07-036

### Development Expertise

We have been developing semiconductor detectors in Phoenix since 2004. The Detector Group is our specialist for customer developments with individual configurations, resulting in high-performance silicon photodiodes and InGaAs avalanche photodiodes for use in the detection of the smallest amounts of light.

### APD Line Arrays for LiDAR and Scanner Applications

At the beginning of 2017, our APD line arrays were introduced for the first time: the low-noise APD arrays made of silicon are assembled in a monolithic row. We offer our customers a standard component with twelve elements that are only 40  $\mu\text{m}$  apart; In addition, our line arrays can be manufactured according to customer requirements.

## LASER COMPONENTS CANADA

Production Site for Pulsed Laser Diodes (PLDs) Now Certified for Automobile Applications

WEB N07-041

### Certified for Automobile Applications

The Canadian production site obtained AEC-Q101 environmental and operation certification for automobile applications. This is further evidence that we work exclusively with high-quality materials and precise production methods. AEC-Q101 certification is part of the production part approval process (PPAP) that was developed for the high-power triple-junction PLD 905D1S3J09UA.

### Introducing QuickSwitch Pulsed Laser Diodes

QuickSwitch PLDs, which emit particularly short pulses, are Canada's latest highlight. In distance measurement, they make it possible to measure distance with greater precision. The laser diode and the high-speed switching electronics are assembled into the compact TO-56 housing of the PLD. Short wire bonding makes it possible to achieve a current path with low inductance, which is necessary for pulse lengths of less than 3 ns. At the same time, this element delivers current peaks that are high enough to produce optical power levels of several tens of watts.

# New Products

## IR Laser Diodes for Use in Gesture Recognition 250 mW Single-mode Laser Diodes

WEB N07-048

Applications in medical technology, printing, and safety technology (IR illumination) require powerful laser diodes that have a longitudinal single-mode beam profile.

Arima Lasers' ADL-83Y51TL is a very good and inexpensive laser diode that is used, for example, in gesture recognition.

The ADL-83Y51TL emits in the NIR range at 830 nm and has a cw power of 250 mW. In pulse operation, it can be overdriven to up to 500 mW.

The small, compact TO-56 housing is hermetically sealed and allows for an operational temperature of up to 60°C. A monitor photodiode is integrated for power control and stabilization purposes. ■

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## Arima's A4 Series: New APC Laser Diodes for More Safety If the beam becomes harmful, the laser diode automatically switches off

WEB N07-148

With its new A4 series, Arima Lasers has significantly improved the automatic power control (APC) of its compact APC laser diodes. Whenever an eye-safe radiation beam is required, this new model offers additional protection: If an internally set operating current level is exceeded, the laser diode shuts down automatically.

The latest laser diodes are insensitive to electrostatic discharges of up to 10 kV and guarantee a stable output power at supply voltages of 2.5 to 6.0 VDC. As in its predecessor, the control is located as an ASIC on the same chip as the photodiode and the emitting laser diode, and it is integrated in compact TO housings (3.3 mm or 5.6 mm). These laser diodes are available in different wavelengths between 635 nm and 850 nm.

APC laser diodes are used, for example, in high-precision measuring devices. ■

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**Arima**  
LASERS





## Clean Water Comes from Within

### Waterproof UVC Modules for Water Purification

WEB N07-242

Water dispensers, aquariums, and analytical devices in biotechnology all require clean, sterile water. Ultraviolet radiation has proven to be an effective method of disinfecting, sterilizing, and cleaning.

For the first time, LG Innotek has developed UVC modules that can be applied where required – either directly next to or even in the water.

This is thanks to water-repellent (IPX7) and waterproof (IPX8) housings. The advantage is obvious: The scattering losses can be kept to a minimum, and the radiation can optimally expand its disinfecting effect.

SMD LEDs are integrated in both modules with a wavelength of 278 nm and an optical power level of 2 mW.

Both modules are just a few centimeters in size and can easily be integrated into many different applications. Voltage sources of 12 V each are sufficient for operation.

Yet another successful expansion of an already successful UVC LED family from LG Innotek! ■

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## Strongest UVC LED in the World!

### Powerful 70 mW Single-Chip UVC LED

WEB N07-042

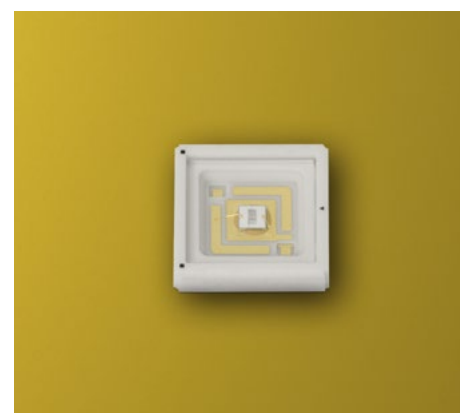
Our partner LG Innotek introduced the world's first 70 mW UVC LED, which was developed for sterilization.

LG Innotek once again set the benchmark for the design of UVC LEDs and rose to the challenge of achieving 70 mW – the largest amount of power possible to date – out of a single element. The other parameters, such as  $I_f$  and  $V_f$ , have not changed from previous models: the improved light emission is based on new LED chip technology.

Despite the modified semiconductor, even the youngest LG Innotek UV LED family member exhibits the familiar, proven quality: lifetime, stability, and reliability are comparable to weaker versions.

UVC light is in high demand for disinfecting air, water, and surfaces. This wavelength can also be used for curing; thanks to its high power, the degree of curing can be increased. For neither of these applications can the power be high enough. Therefore, LG Innotek will not cease its efforts in the development of the next generation of UV LEDs. ■

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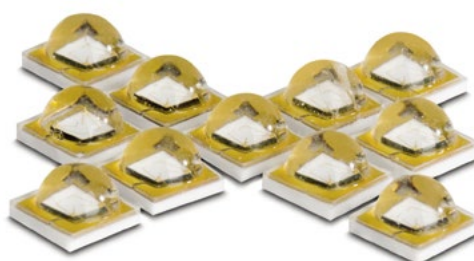
## LEDs from LG Innotek Now Also Available at 415 nm

### High-Efficiency Violet LEDs!

WEB N07-142

With up to 2.5 W per single chip, the new violet LEDs from LG Innotek now offer particularly high power in an extremely small space.

LG Innotek's 415 nm LEDs are available as versions with normal (130°) or narrow (55° and 75°) aperture angles. Both versions are integrated in a  $3.5 \times 3.5 \text{ mm}^2$  SMD housing and feature a long lifespan of approx. 20,000 hours.



The following categories are available:

- **Category G1: general performance**  
Inexpensive LEDs with an optical power level of up to 1.3 W at 0.7 A
- **Category H1: High power**  
A power level of 2.5 W can be achieved at a current of 1.5 A. This is almost double the output power but costs only about one and a half times as much. ■

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## Wireless Laser Power Measurement

### BLU Series – The World's First Wireless Analysis and Control

WEB N07-071

You can finally measure laser power precisely, even in enclosed and hard-to-reach areas, and readout all data clearly without annoying wires or additional display units. Bluetooth technology makes this possible.

With a Bluetooth display unit that is integrated directly in the detector, Gentec-EO's BLU series measurement devices are unique. Within a radius of up to 30 m, the measurement results can be quickly and comfortably readout on all iOS and Android devices. Do you use a PC? Not a problem! We also deliver a suitable Bluetooth receiver as part of the set.

Another advantage for service technicians: Rechargeable lithium ion batteries guarantee continuous wireless operation for up to five days. Therefore, it is only necessary to recharge the unit once in a work week.

As usual with Gentec-EO products, the BLU series detectors are extraordinarily robust and available for precise results from the mW to the kW range. The most popular laser power detectors from Gentec-EO are all available with the BLU option. ■

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## New PRONTO Series Replaces FLASH

### High-Power Laser Power Measurement up to 10 kW without Water Cooling

WEB N07-171

The high-power PRONTO series will replace the FLASH series models. Gentec-EO will be sticking to its usual recipe for success but will also be attending to some improvements: The new measurement devices are calibrated for the wavelength range from 250 nm to 2500 nm and deliver exact results in the visible spectrum and beyond. Calibration for 10.6  $\mu\text{m}$  is available upon request. This significantly improved display and control module with a color touchscreen display is particularly easy to operate.

With just a few clicks, the user can set up all desired parameters. And that is not all: Via a micro-USB interface, measurement data can now be transferred to a computer. Data transfer should also soon be available in the other direction. Gentec-EO has announced that the PRONTO units will soon be completely "remotely controllable" with serial commands via a USB connection.

Users will not miss the familiar performance in laser power measurement and high damage threshold of the detector offered by the FLASH series as it will also be available in the new series: The four models cover the power range from approximately 2 W to a maximum of 10 kW and guarantee extremely high precision with a particularly low noise level (0.1 W in the PRONTO-500). A measurement process lasts just a few seconds, thus making it possible to carry out several measurements before the unit has to be cooled again. The high-power models of the PRONTO series also manage without water cooling and are thus optimally suited for service technicians who have to carry out precise measurements on powerful industrial lasers. ■

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## ThermoComp

### The Complete Mechatronic Solution to Thermal Errors

WEB  
N07-  
201

Temperature changes and thermal effects are some of the largest error sources in precision machines. One major reason for this is the difficulty and often extreme expense associated with designing a thermally insensitive machine. Aerotech's new product feature, ThermoComp, is a complete mechatronic solution to thermal errors. Through the employment of integrated hardware and sensors, and a proprietary compensation algorithm implemented via Aerotech's A3200 controller software, ThermoComp minimizes stage inaccuracy due to thermal effects even over extreme temperature ranges.

Up to 90% of the thermal-related errors can be eliminated, regardless of stage travel and range of temperature change.

Additionally, internal self-heating is another major source of thermal-related positioning errors, particularly in stages without direct feed-back devices such as ball-screw-driven stages. ThermoComp not only prevents environmental changes from affecting positioning performance,

but also diminishes the errors caused through internal heating, eliminating up to 90% of the thermal-related errors caused by the self-heating of a ball-screw-driven stage.

ThermoComp is currently available on all Aerotech PRO Series stages and operates through an intuitive and easy-to-use integrated command set within the Aerotech A3200 controller software. ■

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## Expansion of DOEs for FLEXPOINT® Laser Modules

### The New Pattern Generators Make Green Even Greener

WEB  
N07-  
174

We have new pattern generators. These complex diffractive optical elements (DOEs) are used to split a single laser dot or to shape it into patterns. Depending on the application, these patterns may include cross-hairs, lines, multiple lines, or a dot matrix. Cross-hairs with different fan angles, for example, are widely used in positioning tasks.

#### Pattern Generators for 520 nm

DOEs are ideally optimized for a specific wavelength. Because the green 520 nm wavelength is becoming more and more popular, we have expanded our product range: In addition to a "green cross hair" with a fan angle of more than 50°, we also have a DOE with 15 parallel lines – also designed for the 520 nm wavelength.

#### Also New: Dot Matrices

Several new versions have been added to the dot matrices: 10x10 and 4x6 matrices for green light, as well as 5x15 for red.

We also have a pattern generator available for the first time for a blue cross hair. The fan angle in a 450 nm wavelength is more than 60°.

We also satisfy the requirements of the growing field of 3-D imaging by offering new pseudo-random pattern generators for red and infrared laser modules. ■

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## Small Dot – Large Effect

### High-precision Alignment Lasers with a Small Beam Profile

WEB  
N07-  
274

Many laser module users are not aware that a laser beam exits a housing at a slight angle. Because the laser module appears to squint, the degree of deviation from the housing axis is also referred to as the "squint angle." This phenomenon is most easily demonstrated when the laser module is placed in a prism and rotated along its own longitudinal axis. The laser dot describes a more or less large circle on the wall. This does not have any effect on the majority of applications. The laser is simply set up to hit a certain point.

However, this target point often has to be determined first – as a direct continuation of an axis or of a solid frame. Then, a precision laser is required such as the LT-PLM series that LASER COMPONENTS has offered for many years. These modules have a squint angle of 0.05 mrad. The deviation of the laser beam from the housing axis is, therefore, just 5/100 mm per meter of distance as opposed to 8.7 mm in a standard laser module.

We have expanded our reliable range of products by a version with a 1 mm beam diameter at the exit point. This results in a dot on the target surface that is smaller and more precisely defined. Due to the higher divergence, the application of this version is reasonable at a distance of approximately 3 m.

For larger distances, the standard version with a 4.5 mm beam diameter is still available. Both beam profiles are available in a housing with a 24 mm diameter and an M12 connection or as a version designed for mobile operation in a 35 mm housing with an integrated battery. ■

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## Design Center at LASER COMPONENTS

We are often asked about what makes LASER COMPONENTS so unique. On the previous pages, you have gained some insight into our very different production facilities. All areas of production enjoy a vast professional network; in addition, we have a cross-disciplinary R&D department in Germany that is active in our core technological areas. This combination of different competencies makes us quite special. The following infographic shows the typical development process – from an idea to series production and beyond, including product care. The range of development projects is a challenge that we gladly face: This makes it possible to carry out both customizations in general and bilateral, protected ideas. ■

1. IDEA
2. NDA
3. SPECIFICATION
4. IMPLEMENTATION
5. VERIFICATION
6. SAMPLE APPROVAL
7. SERIES PRODUCTION
8. PRODUCT CARE



TRADE  
SHOWS

EuroExpo Trondheim  
21–22 March 2018  
Trondheim Spektrum  
(Trondheim, Norway)  
Hall E

Scandinavian  
Electronics Event  
24–26 April 2018  
Kistamässan  
(Stockholm, Sweden)  
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