

Matrix

Ocean View

Calibrating the wavelengths of a USB2000

To calibrate a USB2000 you need a light source that produces at least 4 - 6 spectral lines within the region of your spectrometer.



HG1 light source

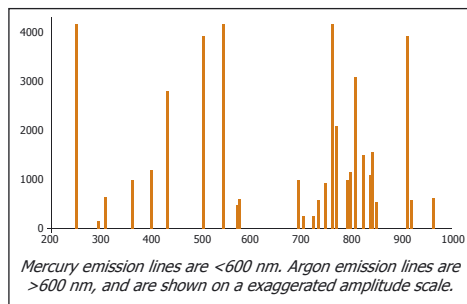
An ideal light source and specially developed for this purpose is our HG 1. This Mercury / Argon calibration light source produce atomic emission lines from 253 - 1700 nm. A list of mercury and argon spectral emission lines is printed on each lamp's housing.

You are going to be solving the following equation, which shows that the relationship between pixel number and wavelength is a third-order polynomial...

$\lambda_p = I + C_1 p + C_2 p^2 + C_3 p^3$...where λ is the wavelength of pixel p , I is the wavelength

of pixel 0, C_1 is the first coefficient (nm/pixel), C_2 is the second coefficient (nm/pixel²), and C_3 is the third coefficient (nm/pixel³). You will be calculating the value for I and the three C s. Please use Microsoft Excel or a similar program to complete the equation.

For detailed steps check our website on:
<http://www.oceanoptics.com/technical/usb2000.pdf> (page 38).



For only € 285 per spectrometer channel, you can purchase the ASP, Annual Service Package, which entitles you to a yearly inspection, wavelength calibration, optical alignment, linearity calibration, signal-to-noise analysis and much more.

Introduction of the NIR256 2.5 spectrometer



NIR256 2.5

We have reached a new level in our NIR series spectrometers with the introduction of the NIR256 2.5. This spectrometer has a stunning wavelength range of 900 nm to 2500 nm.

It is a regular NIR256 but with an optimized grating we were able to expand the maximum wavelength from 2100 nm up to 2500 nm. The detector is cooled up to 30°C below

ambient by a thermoelectric device and can be monitored and controlled via software. This spectrometer is suitable for applications like sugar analysis, nitrogen detection in soils, laser characterization, fat, oil and lipid determination and many more.

Specifications:

- Integration time: 1 ms > 3000ms
- Data Transfer: 10 ms for USB interface
- Signal to noise: 4000:1
- Multiple Trigger modes (free-running & asynchronous)

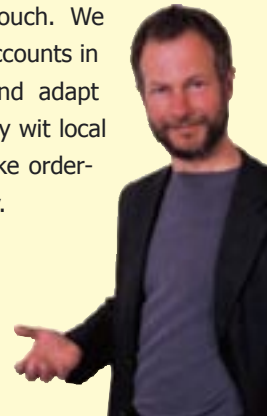
Direct or via distributors

It's always possible to deal with us directly, no matter where you are located. We operate a full-service facility in Duiven, The Netherlands, and ship daily to more than 20 different countries and have a full array of accessories and preconfigured spectrometers in stock for immediate shipment. However we also have a worldwide network of distributors to provide you with local service and support. If you require extensive presales assistance or on site demonstration or a service call, perhaps our distributors frequently offer a service level that for logistical reasons Ocean Optics may not be able to provide. The choice is yours.

For details on international shipments get in touch. We operate also bank accounts in various countries and adapt our routes to comply with local requirements to make ordering with us real easy.

Regards,

Kees van de Steeg
Managing Director



Further in this issue:

- Personnel: Richard Grootveld
- The anatomy of a fiber assembly
- Halma's acquisition
- Vacuum feedthrough series
- Classifying food aesthetically using pattern recognition
- S2000 spectrometer
- 40.000 applications and growing
- Flow cells for flow injection analysis
- Santa's new super deal!
- Tradeshow schedule

Ocean Optics Personal: Richard Grootveld

Hello, I'm Richard. After I have finalized my Physics study I joined Ocean Optics. My prime task is to advise customers on applications and in addition I have set up the calibration lab and I am now in the process of setting up a full service facility for our European customers. This greatly reduces transportation times and costs so you are able to get the most out of your spectrometer. If you have special requirements, need to recalibrate your spectrometer, or want to expand your set up, please contact me and I'm happy to be of service.



Halma's addition of Ocean Optics enables new growth

Halma p.l.c., a multinational holding company based in the United Kingdom, recently added Ocean Optics to its group of more than 50 independent, entrepreneurial-minded high-tech companies.

The Halma Group (www.halma.com) of subsidiaries manufactures products that enhance



Halma's headquarters, about 30 miles west of London, are refreshingly modest for such a large and successful company. And, in keeping with the company's appreciation of the innovative, the building is an eclectic mix of architectural features from the last 300 years of English vernacular architecture.

public safety and minimize hazards in the workplace. The company's business groups focus on fire and gas products, water technology, elevator electronics, process safety, resistors, and optics technologies. Sales in 2003 were \$540 million, ranking Halma (HLMA) among the top 250 publicly traded companies on the London Stock Exchange.

Halma has a long history of supporting the sort of technological entrepreneurship that has defined Ocean Optics since its emergence in 1992 with the world's first miniature fiber optic spectrometer. This support includes resources that will allow us to tackle promising new optical-sensing applications emerging from our daily work with researchers and developers. What's more, there are now opportunities for collaboration with other Halma companies on projects where Ocean Optics technologies can spur development of new applications and products.

Customers get the best of both worlds -- the resources of a large parent company like Halma with the flexibility of Ocean Optics' small-company environment.

VFT-series Feedthroughs

Our VFT-series Vacuum Feed-throughs channel light into or out of vacuum chambers for a variety of applications.

The VFTs are designed as general purpose penetrators for NEMA enclosures. Each VFT is tested to 10^{-9} Torr and operates to 140 °C. Each end of a VFT is terminated with an SMA 905 Connector and couples easily to optical fibers and accessories via a 21-02 Splice Bushing (two are included with each VFT). The VFT can be screwed into a 3/8-24 external threaded hole in the vacuum chamber, or

can be bolted into a smooth hole with the provided nut and washer.



from € 299.-

Anatomy of an assembly

Our Premium-grade "Best for Spectroscopy" Optical Fiber Assemblies are durable, high-quality assemblies that consistently deliver uniform results with minimal signal variance. For more detailed information about the fiber ask for a Quality Control Report that includes the transmission curve of the assembly and serial number of the assembly.

Captive end cap protects fiber tips against scratches and contaminants.

Precision SMA 905 Connector precisely aligns to spectrometer slit; ensures concentricity of fiber; includes laser-engraved serial number.

Color-coded boot collar. It provides strain relief at fiber end and the color indicates fiber material type.

Fiber-diameter band. The color corresponds to the diameter of the fiber.

Jacketing protects the fiber and provide strain relief.

Polymide buffer. It strengthens the fiber.

Doped fused silica cladding.

Pure silica core.

Numerical aperture is 0.22 and yields an acceptance angle of 25° in air.

In need of information?

Please refer to our website for detailed information about all our products:

- Operating Instructions

<http://www.oceanoptics.com/technical/operatinginstructions.asp>

- Software downloads

<http://www.oceanoptics.com/technical/softwaredownloads.asp>

- Engineering documents

<http://www.oceanoptics.com/technical/engineeringdocs.asp>

Or give us a call at +31 26 319 05 00

Application

An Optical Fibre Based System that Classifies Food Aesthetically as it cooks in a Large-Scale Industrial Oven, using Pattern Recognition

M. O'Farrell, E. Lewis, C. Flanagan, W.B. Lyons, N. Jackman

This research is based at the Optical Fibre Sensors Research Group, University of Limerick, Ireland, and involves the application of an optical fibre system to quantitative and on-line monitoring in the food industry. This system utilises optical fibre sensor techniques to evaluate the colour development of food, on the surface and at the core, with exposure to heat in a large-scale industrial oven designed by Food Design Applications Ltd (FDA Ltd.), which is part of the Kent Process Technologies Group Ltd.

The colour classification is used to make an aesthetic decision so that the colour is consistent with the customers preconceptions, for example, roast chickens must be golden, flame-grilled hamburgers must have black lines and cooked sausage must be a rich brown.

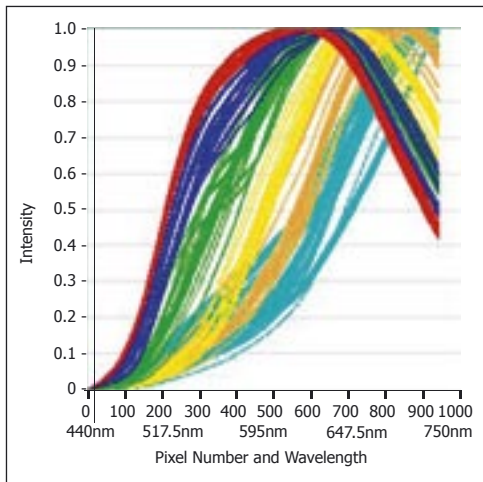


Figure 2: Spectrograph of a colourscale designed for the classification of various products such as Roast Whole Chickens, Marinated Chicken Pieces, Steamed Skinless Chicken Fillets, Sausages, Pastry, Bread Crumb Coating, and Char Grilled Chicken Fillets

40,000+ applications and growing

Our Application Scientists are consultants on your application, and provide assistance both before and after the sale.

Some of the applications:

- Chemistry
- Life Sciences
- Physics / Optics
- Semiconductor Processing
- Medical Research
- Forensics
- Manufacturing
- Food Processing
- Pharmaceuticals
- Biotechnology
- General R&D
- Display Technologies
- Non-destructive Testing



Figure 1: System Setup

For the detection of the reflected light an S2000 spectrometer from Ocean Optics was employed, which allowed operation in the wavelength range of 440-750nm. This was linked to a P.C. such that spectral data was saved for subsequent analysis.

Principal Component Analysis was employed as a method of feature extraction so as to eliminate any redundant information from spectral data. A classifier was used to categorise the spectra and this was implemented using Artificial Neural Networks, ANN.

In previous editions...

If you want to read an application article from a previous edition of the matrix please send an e-mail to info@oceanopticsbv.com and specify one of the following articles:

Matrix issue 1:

- Researchers study effects of mining on coastal erosion and coral reef health in New Caledonia.

Matrix issue 2:

- Oxygen sensor determines hypoxia levels in irradiated human cells.

Matrix issue 3:

- Quantification of urea using Raman spectroscopy.

S2000 Spectrometer

This spectrometer is built for modularity and flexibility. With up to 7 additional spectrometers you can either expand your wavelength range with high resolution or configure the system for multipoint sampling.



Santa is back again!

Santa is back and has an incredible deal for you. For details how to get a Free Dell™ Digital 15GB Jukebox see the next page. Please note that we send this newsletter to you well in advance of the advertising campaign so if you want to order wait until the first of november or get in touch.



Flow Cells for Flow Injection Analysis

Excellent Reproducibility

We offer two optical flow cells with a "Z" configuration, to measure the optical absorbance of fluids moving through flow injection systems.

The flow cell has a 10 mm optical pathlength and a 1.5 mm inner diameter; sample and waste tubing are connected with 1/4-28 fittings (included). Couple flow cells to our spectrometers to monitor wastewater, chemical or biological processes, and immunoassays. These automated fluid sampling systems eliminate measurement errors that can occur with manual handling of solutions.

FIA-Z-SMA: For Use with Standard Fibers

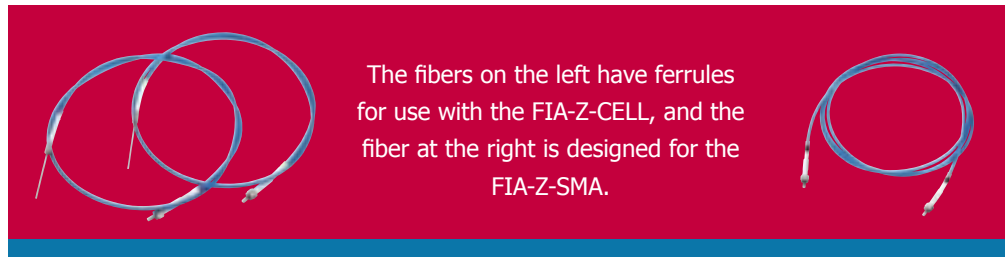


In the FIA-Z-SMA Flow Cell, optical fibers (available separately) connect to SMA 905 fittings to transmit and receive light through the central axis of the Z. The FIA-Z-SMA Cell uses silica windows as wetting surfaces at each fiber optic junction, and is available in PEEK polymer, Plexiglas (pictured), stainless steel or Teflon. The FIA-Z-SMA requires two 200 µm or 400 µm optical fibers.

FIA-Z-CELL: For Use with Ferruled Fibers

The FIA-Z-CELL Flow Cell is a variation on the FIA-Z-SMA that instead of windows uses optical fibers in 1.58 mm ferrules, a design that allows you to slide the ferrules in and out of the cell to adjust the optical pathlength from 0-10 mm. Standard cell materials are PEEK polymer, Plexiglas, stainless steel and Teflon.

from € 347.-



The fibers on the left have ferrules for use with the FIA-Z-CELL, and the fiber at the right is designed for the FIA-Z-SMA.

- ❖ Store up to 7.000 songs.
- ❖ Listen for 20 hours straight.
- ❖ Carry your cd collection with you always!



HR2000CG-UV-NIR

Wide Range, High Resolution

Cover 200-1090 nm at 1.0 nm resolution (FWHM) with a single spectrometer, order sorting filter eliminates second- and third-order effects: € 3,799.-

USB2000-FLG

The Ultimate In fluorescence!

Special mirrors and variable delay microcode increase system sensitivity to improve fluorescence detection; 380-1050 nm: € 2,849.-

USB2000 UV-VIS or VIS-NIR

Versatile UV-VIS/VIS-NIR Instruments

Analyze 200-850 nm or 350-1000 nm ranges; switch out modular light sources and sampling accessories for various applications: € 2,517.- or € 2,374.-



Buy one of these preconfigured spectrometers and get a FREE Dell™ Digital 15GB Jukebox!*

* This offer is valid on these preconfigured spectrometers purchased at retail price between November 1 - December 31, 2004. Limit one Dell™ Digital 15GB Jukebox per order.

Tradeshows schedule

- **Opto 2004**
19 - 21 October 2004
Paris, France
- **Het Instrument**
1 - 5 November 2004
Utrecht, The Netherlands
- **Optics in Sweden**
9 - 10 November 2004
Linköping, Sweden
- **LEOS Benelux Chapter**
2 - 3 December 2004
Ghent, Belgium
- **Ipot & Machine Vision 2005**
16 - 17 February 2005
Birmingham, United Kingdom

Trade-in program

We realize that it's tough to keep up with ever-changing technology. That's why we've made our trade-in program as painless as possible. The only "catch" is that you have to ship to us the outdated or discontinued product before receiving your trade-in discount.

For more information please give us a call or check the inside back page of our catalog.



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