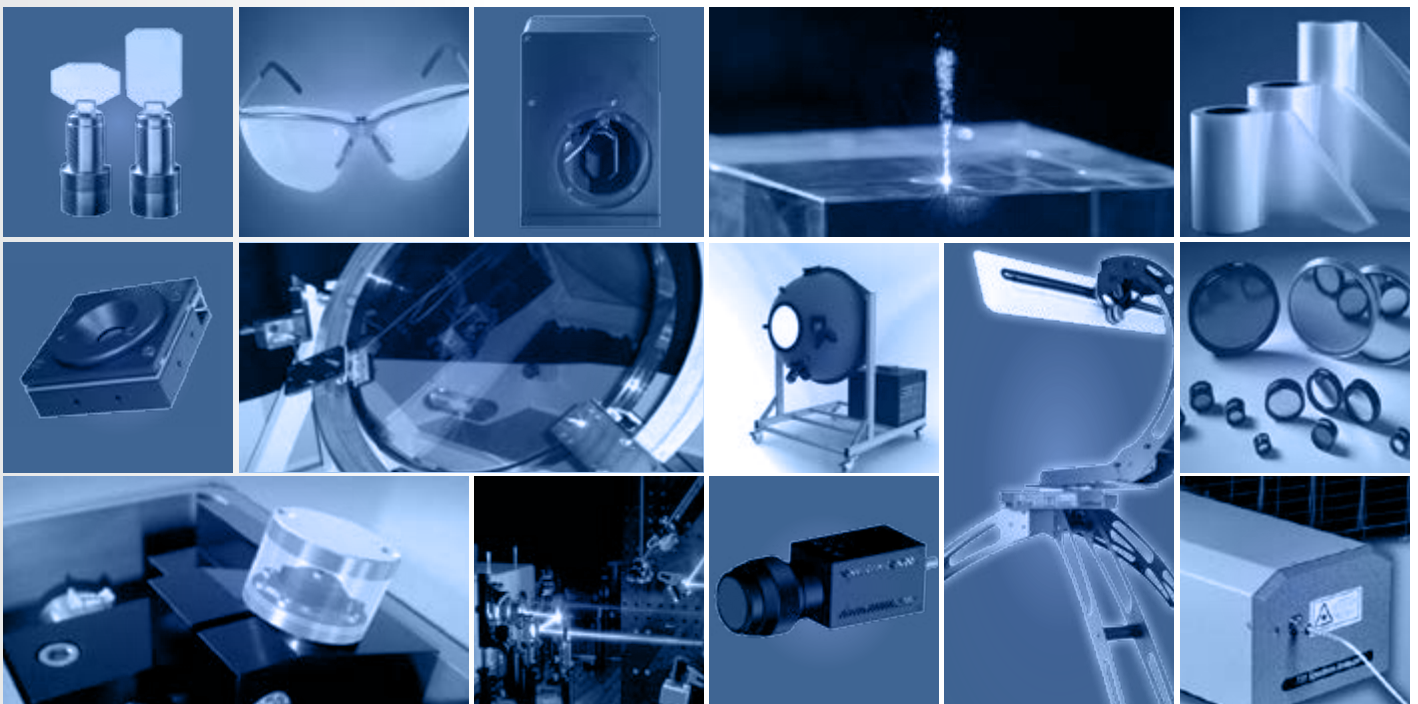


# Photonics

European leader in advanced technology solutions



Denmark  
Finland  
Norway  
Sweden

Tel : +45 70 26 22 25  
Tel : +358 207 969 770  
Tel : +47 (0)32 16 2060  
Tel : +46 (0)18 56 58 30

Email : info@acalbfi.dk  
Email : info@acalbfi.fi  
Email : info@acalbfi.no  
Email : info@acalbfi.se

consult. design. integrate.

## About Acal BFi

Acal BFi are Europe's leading provider of advanced technology solutions, operating in 12 countries throughout Europe.

We offer products across specialist technology areas, each with a dedicated pan-European sales team. Customers use our design-led expertise and expert consultation services to find the best technology solutions for their design, prototype and production needs.

## Get in touch

Acal BFi Nordic AB (Denmark)  
Jernbanegade 23 B  
DK-4000 Roskilde, Denmark

Tel: +45 70 26 22 25  
Email: [info@acalbfi.dk](mailto:info@acalbfi.dk)

Acal BFi Nordic AB (Finland)  
Teknobulevardi 3-5  
FI-01530 Vantaa, Finland

Tel: +358 207 969 770  
Email: [info@acalbfi.fi](mailto:info@acalbfi.fi)

Acal BFi Nordic AB (Norway)  
PO Box 74  
3529 Royse, Norway

Tel: +47 (0)32 16 2060  
Email: [info@acalbfi.no](mailto:info@acalbfi.no)

Acal BFi Nordic AB (Sweden)  
Fålhagsleden 59  
Box 3002  
SE-750 03 Uppsala, Sweden

Tel: +46 (0)18 56 58 30  
Email: [info@acalbfi.se](mailto:info@acalbfi.se)

[www.acalbfi.se](http://www.acalbfi.se)

## Products and support

Cables and Connectors

Embedded computing

Imaging

Magnetic components

Power

Semiconductors

Electromechanical

Fibre optics

M2M and Wireless modules

**Photonics**

RF and Frequency control

Sensors

## A short introduction to Acal BFi Photonics

The Acal BFi Photonics business originally started in 1973 under the Optilas name and has been the first European distributor of optics, lasers and related instrumentation. More than 40 years later we are still unique, being the largest European distributor and service supplier in the Photonics market and the only one with a pan-European coverage.

Our sales and service team of more than 40 engineers dedicated to Photonics are highly focussed on the customer support for the following products:

- **Lasers** - from large volume OEM integrators in the biomedical or laser material processing markets, to the most sophisticated picosecond or femtosecond laser systems for research work.
- **Passive optical components** - addressing laser users and designers, and the LED and luminaires lighting market.
- **Active optical components** - we offer a wide range of solutions including unique technologies and performance for modulators and galvanometer-based scanners, high end laser material processing and some proprietary technologies.
- **Optical instrumentation** - dedicated to laser characterisation from power and energy to wavelength, beam profile or  $M^2$ , spectroscopy from high-end scientific equipment to low-cost OEM solutions and photometry including LED, luminaires and display characterisation.



### Recent additions to our offer

- Launched our own optics range, focused on high-end femtosecond/attosecond applications.
- New range of all-digital, maintenance-free scanning heads, offering improvement of a factor of two to three over the best-in-class competitor in terms of speed verses accuracy combination
- New range of LED and luminaires goniometer characterisation solutions which are significantly cheaper, easier to use and more compact than those previously available.
- Entered into the Terahertz market with some unique solutions.

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# Lasers, diodes and laser diode modules

We offer a wide range of lasers and laser solutions for a variety of applications, from heavy-duty industrial environment to academic research work.

## Industrial and scientific lasers

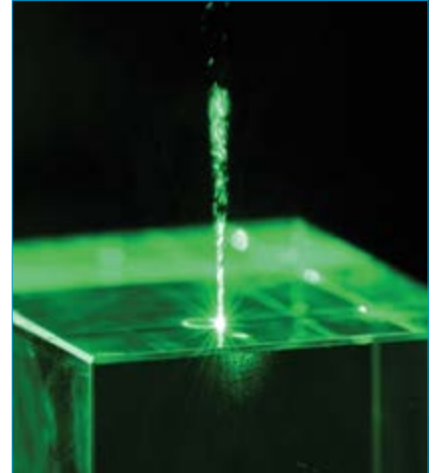
We offer both industrial and scientific lasers. Our technologies include unique features such as high-energy picosecond lasers or compact sub-nanosecond lasers at the price of a traditional nanosecond solution, providing an innovative and affordable solution for a variety of laser material processing applications. We also supply ultrafast lasers as well as best-in-class tunable OPOs at low to multi-kHz repetition rates, covering the entire wavelength range from UV to 16 microns.

### Most popular products

- DPSS lasers
- Fibre lasers
- CO<sub>2</sub> lasers
- Femtosecond / picosecond lasers
- OPOs from UV to MIR
- White light continuum lasers

### Typical applications

- Laser material processing
- Biomedical instrumentation
- Spectroscopy
- Ultrafast studies and OPCPA
- LIDAR and range finders
- Terahertz wave generation



Glass material processing with sub-ns DPSS green lasers allows very high-quality volume marking at an affordable cost

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## Compact DPSS lasers, laser diode modules and laser diodes

Offering a wide range of wavelength and power in visible and near infra-red based on very compact DPSS lasers, laser diodes or collimated laser diode modules. These are usually available in both CW or pulsed mode and in scientific or OEM packaging. We can also supply the highest standards of short-pulse laser diodes, which are qualified for defence and space applications.

### Most popular products

- Short pulse laser diodes
- OEM DPSS modules
- Collimated or beam shaped diodes
- Compact visible DPSS
- Fibre coupled custom packages

### Typical applications

- Alignment, patient positioning
- Machine vision
- Biomedical instrumentation
- Lidar / range finders / telemetry
- Phototherapy



Patient positioning using a red laser diode module



Laser safety equipment

# Active and passive optical components

Our laser optics offering is the result of 40 years of collaboration with industry leaders. We have partners and sub-contractors in Europe, Asia and North America and access to the widest range of material and coating technologies on the market today. Combined with the technical expertise of our engineers, we can help customers find the right product at the right price for virtually any specific laser application and supply them with the product that best fits their needs.

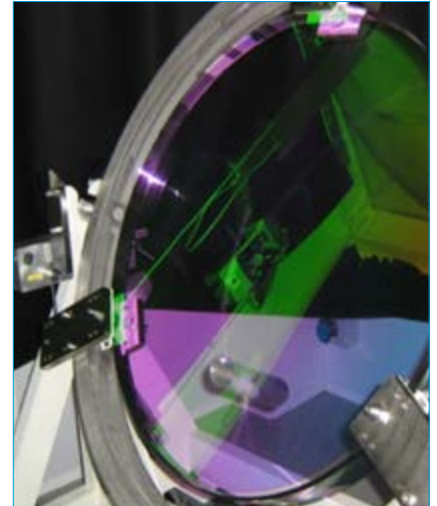
Our capabilities range from high-volume, price-competitive components to the ultimate performance optics.

## Most popular products

- Ultrafast laser optics
- F-theta lenses and beam expanders
- High damage threshold optics
- Mirrors, polarisers and waveplates
- Interference filters
- Rods, non linear crystals and gratings

## Typical applications

- Solid state laser manufacturers
- Laser material processing
- Instrumentation manufacturers
- Spectroscopy
- Ultrafast laser set-ups
- Laser integrators



Acal BFi's range of ultrashort femtosecond optics offers the highest combination of bandwidth and performance on the market today

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## Laser scanning heads, scanners and modulators

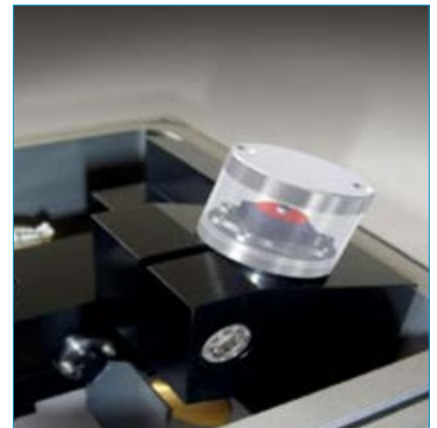
We have the widest range of technologies available in Europe for laser modulation, covering most laser parameters: intensity, polarisation, phase, angle and frequency. The range includes galvanometer-based scanners and scan heads including the highest performance available today, acousto-optic devices ideal for high-power infrared lasers or Q-Switches, electro-optic devices (high-speed modulation, Pockels cells), Photo-Elastic Modulators (PEM, which is very popular in ellipsometry, polarimetry or birefringence measurements) or mechanical shutters.

## Most popular products

- All digital 2D and 3D scan heads
- Galvanometer scanners
- Acousto-optic modulators/deflectors
- Electro-optic modulators/Q-switches
- Photo-Elastic Modulators
- Mechanical shutters

## Typical applications

- High-speed wobbling
- Large area laser processing
- High speed hole drilling
- High power CO<sub>2</sub> laser modulation
- Q-switching
- Ellipsometry and birefringence measurement



Acal BFi's innovative maintenance-free all-digital scan heads are maintenance free and offer unsurpassed performance for high-end applications where both speed and accuracy are required simultaneously, such as large-area processing, high-speed wobbling or hole drilling

# Instrumentation solutions for spectroscopy and laser beam analysis

## Laser beam characterisation

Acal BFi have been offering sales, service and calibration of laser beam characterisation tools for more than 40 years. We offer a complete range of instruments to fully characterise a laser - power, energy, beam profile,  $M^2$ , wavefront, wavelength and spectrum. We support customers with demonstrations, installation, training, after-sales calibration and after-sales service. Capabilities also include customised solutions for high-volume or high-end applications.

### Most popular products

- Power meters
- Energy meters
- Laser beam profilers and  $M^2$  measurement
- Wavefront analysers
- Wavemeters and spectral analysers

### Typical applications

- Laser manufacturers and users
- Medical laser systems
- Laser alignment
- Fundamental research
- Telecom



Spectral analysers are one of the many instruments Acal BFi offer to test customer lasers, for alignment during manufacturing or at the end-user's facility

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## Spectroscopy

From UV to 12 microns, Acal BFi work with world leaders to support customers with a variety of spectrometers and spectral analysis solutions. Our solutions include traditional spectrometers but also MEMS based solutions using either Michelson or Fabry-Perot interferometers. From bench top systems to compact integrated systems that can be used in UAV and low cost solutions for IR spectroscopy, our team of experts will ensure you get the spectrometer solution you need at the optimum cost.

### Most popular products

- Grating-based spectrometers
- FT-IR spectrometers
- MEMS based spectrometers
- OEM modules
- Light sources, fibre probes and cuvettes

### Typical applications

- Transmission and absorption measurements
- Raman spectroscopy
- Fluorescence spectroscopy
- IR gas analysis and detection
- LIBS and ultrafast studies



Acal BFi offers several affordable solutions for IR spectroscopy. Above is a FT-NIR MEMS based spectrometer

# Components and instrumentation for displays, LEDs and lighting

## Photometry

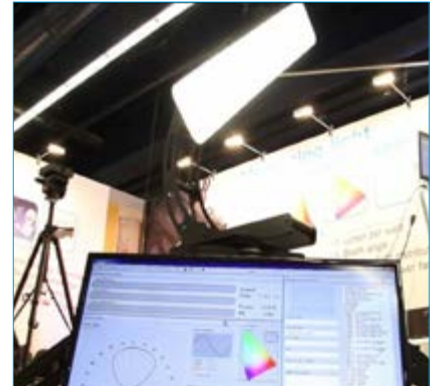
Displays and LED lighting systems are everywhere now and will continue to develop even further. This has been driving the need for affordable solutions to test displays and light sources. Acal BFi have been active in supplying to the market for more than a decade. From smart phone displays to the largest TV screens or movie theatres, from simple LED lamps and luminaries to the most complex lighting solutions.

### Most popular products

- Goniophotometers
- Videophotometers
- Integrating spheres
- Uniform light sources
- OEM light analysis modules

### Typical applications

- Displays characterisation
- LED and Luminaries testing
- Luminaires measurements
- Movie theatres and home cinema calibration
- Colour test and sorting



Acal BFi's LabSpion is the first affordable and transportable goniometer test station for luminaries up to 1.5m in length. Its well thought software allows easy access to and reporting of all required parameters for inspection and quality control

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## Light shaping diffusers

Traditional diffusers have very poor transmission and limited shaping capabilities. Our patented technology enables us to overcome these drawbacks. It offers very high transmission, which is becoming more important with lighting moving to LEDs and energy savings concerns. It also offers virtually limitless possibilities of beam shaping, which has become key in many applications, from industrial and medical, to public transport, street lighting and architectural lighting.

These diffusers are available in the form of films, rigid substrate or embedded into moulded optics.

### Most popular products

- High-transmission diffusers
- Beam-shaping diffusers
- Films for display enhancement
- Moulded optics diffusers
- Directional turning films

### Typical applications

- Displays
- Architecture lighting
- Street lighting and road signs
- Public transport
- Museum lighting



LED lighting is now everywhere and Acal BFi offer unique solutions to combine efficiency and uniformity



Acal BFi Belgium  
Lozenberg 4  
1932 Zaventem  
Belgium

Tel: +32 (0)2 720 5983  
Fax: +32 (0)2 725 1014  
Email: sales-be@acalbfi.be



Acal BFi France SAS  
4 Allée du Cantal  
Z.I. La Petite Montagne Sud  
CE 1834 - Lisses  
91018 EVRY Cedex, France

Tel: +33 (0)1 60 79 59 00  
Fax: +33 (0)1 60 79 89 01  
Email: sales-fr@acalbfi.fr



Acal BFi Germany GmbH  
Oppelner Straße 5  
82194 Gröbenzell  
Germany

Tel: +49 (0)8142 6520 0  
Fax: +49 (0)8142 6520 190  
Email: sales-de@acalbfi.de



Acal BFi Italy SRL  
Via Cascina Venina n.20/A  
20090 Assago (MI)  
Milan  
Italy

Tel: +39 02 53583.1  
Fax: +39 02 53583201  
Email: sales-it@acalbfi.it



Acal BFi Italy SRL  
Via E. De Marchi 27  
00141 Roma  
Italy

Tel: +39 06 86894259  
Fax: +39 06 86895354  
Email: sales-it@acalbfi.it



Acal BFi Netherlands BV  
Luchthavenweg 53  
5657 EA Eindhoven  
The Netherlands

Tel: +31 (0)40 250 7400  
Fax: +31 (0)40 250 7409  
Email: sales-nl@acalbfi.nl



Acal BFi Iberia SL  
C/ Anabel Segura, 7-bajo  
Alcobendas  
28108 Madrid  
Spain

Tel: +34 91 453 1160  
Fax: +34 91 539 4404  
Email: sales-es@acalbfi.es



Acal BFi Nordic AB (Sweden)  
Fålhagsleden 59  
Box 3002  
SE-750 03 Uppsala  
Sweden

Tel: +46 (0)18 56 58 30  
Fax: +46 (0)18 69 66 66  
Email: info@acalbfi.se



Acal BFi UK Limited  
Unit 14G Maynooth Business  
Campus, Maynooth  
Co. Kildare  
Ireland

Tel: +353 (0) 1 629 2640  
Fax: +353 (0) 1 629 2637  
Email: irishsales@acalbfi.co.uk



Acal BFi UK Limited  
3 The Business Centre  
Molly Millars Lane  
Wokingham  
Berkshire, RG41 2EY  
UK

Tel: +44 (0)1189 788 878  
Fax: +44 (0)1189 776 095  
Email: sales-uk@acalbfi.co.uk