



OPTICS | COMPONENTS | SYSTEMS

PHOTONICS | OPTICS | FIBER OPTICS | LASER-MEDICAL TECHNOLOGY



YOUR GLOBAL PARTNER – save time and money



YOUR GLOBAL PARTNER

For Photonics, Laser- & Medical Technology



bdlp   

BUSINESS DEVELOPMENT
LASER-PHOTONICS

You will find our photonics service
range at: www.bdlp.de

International business development
Opening up of new business fields
Distribution / Agency
Technology consulting and patent research
International network in Europe, Asia and the USA
Consulting and coaching in photonics, optics,
fiber optics, laser and medical technology, lighting

Laser technology components
Optical and opto-mechanical components
Precision, sapphire and quartz glass optics
Coatings, filters
Individual customized developments
Fiber optics, laser cable systems



Founder, CEO, Instructor, Consultant with advanced knowledge in general management disciplines. CEO for financial, personnel and business development and CTO in a high technology business field. Superior experience in international customer services in laser, optical components, fibers & photonics and R&D.

Your Specialist | Dieter W. Frank



OPTICS | COMPONENTS | SYSTEMS

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Laser windows



Flow tubes & pipes



Flat components with bores, grooves



Components for industry, laboratory and instrument engineering

QUARTZ GLASS

For laser and medical technology, photonics, opto-electronics, system engineering and semiconductors

OPTICAL QUARTZ GLASS COMPONENTS

Customized flat optical and spherical precision quartz glass components

- Every desired configuration possible
- Natural and synthetic quartz crystals
- Orientated and random quartz crystal possible
- Customized AR or HR coatings
- Repair service for laboratory equipment
- Manual and automatic quartz glass blowing workshop

Quartz products for industry and science

Flat windows, prisms, wedges, slides, lenses

Rods, tubes, capillaries

Molded parts and substrates

Our specialties

Laser windows, laser caps

Flow plates, flow tubes

Flat components with bores, grooves, steps, etc.

Flatness of the surface up to $\lambda/20$

Polishing quality in accordance with DIN 10110 up to P4

Components in socket

Application

Optics, photonics, opto-electronics, sensors

Laser and medical technology

Laboratory and instrument technology, chemical industry, semiconductor industry

Aerospace industry

Lighting technology, mechanical engineering

R & D, special technology

Quartz glass and quartz crystal are used because of their wide transmission range and their high melting point as well as their birefringence.

Standard sizes of flat components

Dimensions: \varnothing 0.5/ \square 0.5 - 1,000 mm; thickness: 0.1 mm to 250 mm

Tolerances: up to ± 0.001 mm, parallelism: up to $\parallel 5''$

Surface accuracy, flatness of the surface up to $\lambda/20$

Polishing quality in accordance with DIN 10110 up to P4

Geometries, e.g. rectangular, round, ellipsoid, rod-shaped



*Sapphire components
with bores and grooves*



Sapphire optics



*Industry, laboratory,
instrument engineering*



SAPPHIRE

Sapphire components for optics, laser technology, life science and industry

OPTICAL COMPONENTS AND SAPPHIRE COMPONENTS FOR INDUSTRY AND RESEARCH

- Sapphire components orientated and random
- From the simple protective window to optical precision components
- Customized AR or HR coatings
- Every desired configuration – windows, plates, rods, tubes and lenses

Sapphire products

Sight glasses / protective windows / measuring windows / camera windows / vacuum windows / lenses / prisms / wedges / flat plates / rods / tubes / nozzles / valves / molded parts / profiles / tips / blades / guides / balls / insulators / claddings / pipes / capillaries / fibers

Application

Optics, photonics, opto-electronics, sensors | Laser and medical technology | Laboratory and instrument engineering | Chemical industry | Aerospace industry | Vacuum technology, mechanical engineering | R&D, special technology

Sapphires are distinguished by their special thermal, electrical, optical and mechanical properties which make them different from other materials. Sapphire features high mechanical strength and thermal insensitivity as well as high mechanical resistance to wear and attrition

Technical data

C-axis / random (not orientated)

High purity

Dimensions: Ø/□ 0.5 - 150 mm / thickness: up to 100 mm, tolerances: up to +/- 0.01 mm / parallelism: up to // 5"

Standard geometries of flat components

rectangular, round, ellipsoid, rod-shaped, tubes also with bores, grooves and threads

Surface accuracy: Flatness of the surface up to $\lambda/10$, polishing quality in accordance with DIN 10110 up to P4

Roughness depth Ra 0.5 μm / high cleanliness

Technical parameters

Crystal structure: Monocrystal aluminum oxide Al_2O_3 (99 %)

Pressure resistance: 21,500 kg/cm^2 , tensile strength at 20 °C 4,100 kg/cm^2 , tensile strength at 1,000 °C 2,300 kg/cm^2

Tensile modulus: 2.5 x 106 kg/cm^2 , hardness: 9 Mohs 2200 Knoop to the C-axis

Melting temperature: 2,050 °C, application temperature: 1,800 - 2,000 °C (permanent exposure possible)

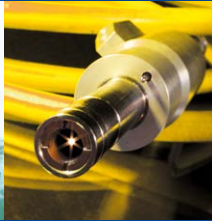
Poisson's factor: 0.29, refractive index: nd 1.760, transmission: > 80 % (300 - 5,000 nm)



Laser technology



Laser medicine



Laser cables & beamline



LASER TECHNOLOGY COMPONENTS

For more laser performance | OEM key supplier to the European laser industry

CUSTOMIZED COMPONENTS, PARTS AND SYSTEMS

- Individual development and production according to your technical requirements
- Optical, opto-electronic and opto-mechanical precision parts and systems for laser technology and photonics
- Industrial partner to manufacturers and developers of laser technology and mechanical engineering and their users
- Development and production of complete modules and systems
- Fiber optic beamline systems in laser material processing
- Medical fiber optic laser cable systems for laser medicine

Our specialty

Laser windows, laser terminating windows, laser protection windows

Flow plates, flow tubes

Quartz and sapphire optics

Laser mirrors, mirror substrates, laser coatings

Dielectric interference filters

Lenses, ZnSe lenses

Prisms, wedges

Non-linear laser optics (NLO)

Optical systems, deflection systems, collimation and focusing systems

Laser cables, laser accessories

Laser technology components

Filters, glass cavities and laser tubes, laser rods, laser slabs, laser crystals

Ge-optics, CaF₂-optics, flash lamps, special lamps, resonators, laser cables

Application

Laser and medical technology, mechanical engineering

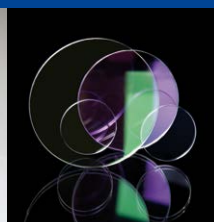
Optics, photonics, opto-electronics, sensors

Aerospace industry

R & D, special technology



Laser caps



Laser windows



Optical systems

One-stop supplier!
bdlp – Your first stop when you need
quality products for your laser.



If the protective window that you need is not listed, please contact us or send us your specifications (dimensions, coating, etc.) and we will make an appropriate offer.

LASER WINDOWS

Specifications for protective windows

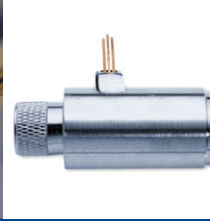
- Standard substrate: Quartz glass
- Standard tolerances: $\varnothing \pm 0.1$ mm or $+0/-1$ mm, thickness ± 0.1 mm
- Edge cut with protective pane: 0.3 mm x 45° (other substrate [e.g. N-BK7, B270], tolerances on request)
- Surface quality: Optically cut & polished on both sides acc. to DIN ISO 10110, P4 flatness both sides $\lambda/2$ - λ & $\lambda/2$ - $\lambda/4$
- Standard coating: both sides AR for 1064 nm, $T \geq 99.5\%$; both sides AR for 808 nm, $T \geq 99.5\%$; Wideband anti-reflective coating both sides for AR 800-1,000nm AR (low absorption BBAR); polarization: s, p
Angle of incidence: AOI = $0-20^\circ$
- $T \geq 99.5\%$ / $R \geq 0.5\%$
- with SiO₂-layer (passivation)
- Laser destruction threshold: > 500 W/cm² (other AR coatings [e.g. 2,100 nm, 980 nm, 532 nm] & specifications)
- Wipe and scratch-proof in accordance with MIL-C-48497, adhesive tape pull-off test in accordance with MIL-C-48497, incl. output test report & T-curve

Wavelength in nm	Dimensions Ø x thickness in mm
1064	113 x 3,00
1064	100 x 4,00
1064	100 x 3,00
1064	80 x 3,00
1064	76,2 x 1,60
uncoated	76,2 x 1,15
1064	70 x 3,25
1064	65 x 2,00
800-1000	60 x 3,00
1064	60 x 2,00
1064	60 x 1,50
1064	59 x 1,15
uncoated	59 x 1,15
1064	55 x 2,00
1064	55 x 1,50
1064	54 x 2,00
1064	54 x 1,50
1064	54 x 1,15
uncoated	54 x 1,15
1064	50,80 x 3,00
1064	50 x 5,00
1064	50 x 3,00
808	50 x 3,00
1064	50 x 2,00
1064	50 x 1,50
uncoated	50 x 1,50
1064	50 x 1,15
uncoated	50 x 1,15
808	48 x 1,50
1064	46 x 1,15
1064	45 x 1,15
uncoated	45 x 1,15
uncoated	41 x 1,15
1064	40 x 2,00
1064	40 x 1,50
1064	40 x 1,50
1064	38,1 x 2,00

Wavelength in nm	Dimensions Ø x thickness in mm
uncoated	38,1 x 1,15
1064	38 x 3,00
1064	38 x 2,00
uncoated	38 x 2,00
1064	38 x 1,20
uncoated	38 x 1,20
1064	35 x 1,60
1064	31,75 x 1,70
uncoated	31,75 x 1,15
1064	30 x 3,00
1064	30 x 2,00
uncoated	30 x 2,00
1064	30 x 1,50
uncoated	30 x 1,15
uncoated	28,50 x 1,15
uncoated	28,00 x 1,15
1064	27,94 x 2,00
1064	27 x 2,00
1064	27 x 1,50
uncoated	25,40 x 3,00
1064	25,40 x 1,15
1064	25 x 4,00
1064	25 x 3,00
uncoated	25 x 3,00
1064	25 x 1,00
1064	24 x 1,15
uncoated	24 x 1,15
1064	24 x 1,00
uncoated	23 x 1,15
1064	23 x 1,15
1064	22,50 x 1,50
1064	20 x 1,15
uncoated	19 x 1,15
1064	19 x 1,15
1064	13 x 2,54
1064	10 x 1,00
uncoated	10 x 1,00



*Laser tech., photonics,
system engineering*



Fiber optics, optics



Sockets, holders, housings

OPTO-MECHANICAL COMPONENTS

Opto-mechanical solutions for laser technology, photonics, opto-electronics, system and instrument engineering

INDIVIDUAL OPTO-MECHANICAL SOLUTIONS FROM MODEL BUILDING TO LARGE-SCALE SERIES

- Customized products are developed and manufactured quickly, flexibly and inexpensively
- Exact production and accurate adaptation to the applications
- Short development time, global know-how
- Small and large series according to your individual wishes
- Materials available with many different surface qualities and geometries
- Natural, black, colored, gold-plated anodized surfaces
- Labelings and markings by laser

Application

Laser technology / precision logic / fiber optics

Medical technology / optronics / sensor technology

Aerospace industry / microsystem technology

Mechanical engineering / instrument engineering

Lighting and signal technology / environmental technology

Mechanical components

Opto-mechanical building systems / micro-positioning / sockets / holders / filter wheels / mechanical installation elements / system elements / lenses / opto-electronic modules / LED technology /

Opto-mechanical plugs / measuring and test systems / housings / measuring rigs

Standard materials

Aluminum / stainless steel / copper / brass

All surfaces can be delivered anodized, nickel-plated, galvanized, gold-plated as well as surfaces with top-coat and structured paints, reflection-reducing paints and enamels.



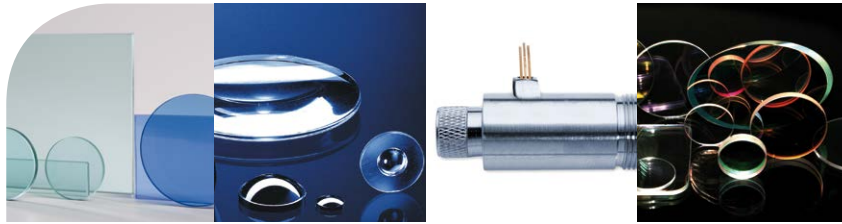
*Optical sockets opto-
electronic modules*



*Micro-positioning sockets,
holders, filter wheels*



*Fiber optics, connectors,
collimation systems*



*Flat optics with
AR/HR coatings*

Laser optics

*Special optics, Co2 optics,
laser optics, crystals*

Prisms & wedges

PRECISION OPTICS FROM UV TO IR

Optical components and parts for industry and science

Thanks to our many years of experience and successful activity, we are very familiar especially with the technological fields of laser and medical technology, photonics, opto-electronics, sensors, mechanical engineering as well as system engineering and have extraordinary and extensive possibilities for the development, design and production as well as customer-specific consulting.

Our customers include renowned international companies and scientific institutions in Germany, Switzerland, the EU and Asia. Our partners are medium-sized companies as well as international enterprises.

Key competences

- We can accomplish all tasks professionally and quickly.
- We are able to fulfill all individual customer wishes reliably.
- We produce and implement optical components, parts and systems according to your requirements.
- Creation of design drawings, feasibility studies and completion of optical calculations.
- We offer various dielectric and metal coatings.
- We are specialists for the complete world of lasers.
- Laser accessories (we supply components and systems for laser technology).

Business Development Laser-Photonics operates worldwide and has comprehensive know-how.

Standard components

Optical elements made of glass, crystals and special materials with flat and spherical surfaces with a flatness of the optical surfaces better than $\lambda/10$.

Windows, terminating and protective windows

Flat and wedged plates, Brewster windows, prisms,

sapphire and quartz optics

Laser optics, laser mirrors, mirror substrates

Crystal optics, crystal processing

Coatings, laser coatings, mirrors

Filters, colored glass filters, dielectric interference filters, displays, instrument glasses

Lenses and lens systems

Press optics (molded optics)

Optical systems, collimation and focusing systems, lenses



Laser technology



Airport airfield lighting



Lighting color
Effect filters



Optics

COATINGS

Coatings for optical and technical glass components for all spectral ranges

INDIVIDUAL AR COATINGS FOR PRECISION AND LASER OPTICS VARIOUS INDUSTRIAL APPLICATIONS

Our specialty

- Ω Electrically conductive coatings
- Tube coatings (inside and outside) AR coating and color effect
- !! Special coatings on request

Standard anti-reflective coatings

AR-VIS 450 - 750 nm $T > 99\%$, $R \leq 0.3\%$ (AUI=0°)

AR-NIR 720 - 1100 nm $T > 99\%$, $R \leq 0.3\%$ (AUI=0°)

AR-diode 800 - 940 nm $T > 99\%$, $R \leq 0.2\%$ (AUI=0°)

AR-YAG 1064 nm $T > 99\%$, $R \leq 0.2\%$ (AUI=0°)

Wideband anti-reflective coating both sides for AR 800 – 1000 nm AR (low absorption BBAR)

Polarization: s, p - angle of incidence: AOI=0 - 20° - $T \geq 99.5\%$ / $R \leq 0.5\%$ with SiO₂ layer (passivation)

Laser destruction threshold: $> 500 \text{ W/cm}^2$

Wipe and scratch-proof in accordance with MIL-C-48497, adhesive tape pull-off test in accordance with MIL-C-48497, incl. T-curve

Color effect filters for airports, architecture, object design and entertainment

Customized, individual, innovative solutions

- Technically high precision (e.g. Airport, railroad) and architectural tasks.
- Manufacture of every color shade palette on different glass, quartz glass and glass ceramic substrates with almost every geometry.
- Color effect filters with excellent chromatic and mechanical stability
- Project and quality management

Filters for optical systems and lighting technology

Heat protection filters

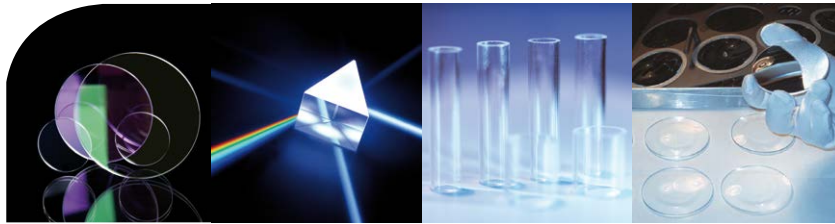
To reduce the heat development of the light, IR band-elimination filters are used as heat protection filters (IR $< 5\%$) with retention of the full spectrum ($T > 90\%$).

The IR proportion in the light radiation is eliminated here without altering the chromatic properties of the light source.

UV band-elimination filter

To reduce the UV proportion of the light with retention of the full spectrum ($T > 90\%$) dielectric UV band-elimination filters (UV $< 2\%$ at $< 380 \text{ nm}$) are used.

The UV proportion in the light radiation in the light spectrum is eliminated here without altering the chromatic properties of the light source with retention of the full spectrum ($T > 90\%$).



*Laser protection
windows*

*Prisms, mirrors,
windows*

AR coating glass tubes

Lenses

CONVERSION FILTERS for lighting, entertainment, cinema technology and life science

For changing the color temperature of light sources.

The conversion filters feature high transmission, chromatic, mechanical and chemical stability as well as heat resistance (up to 350 °C).

Standard conversion of daylight to artificial light

Conversion filters modify the color temperature of a light source from 5,600 K to 3,200 K

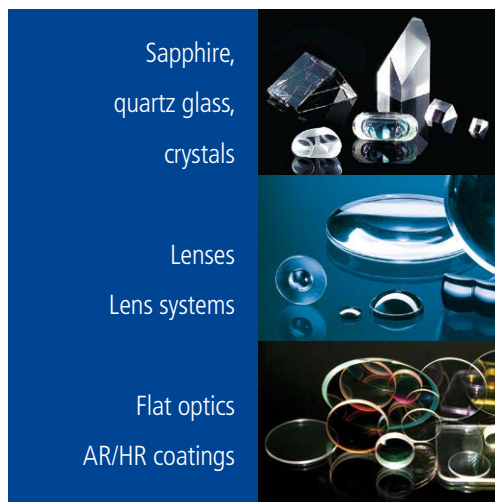
HR coatings

Dielectric mirror coatings for laser application

Cold light mirrors

Customized cold light reflectors ($R > 95\%$) especially for cold light sources

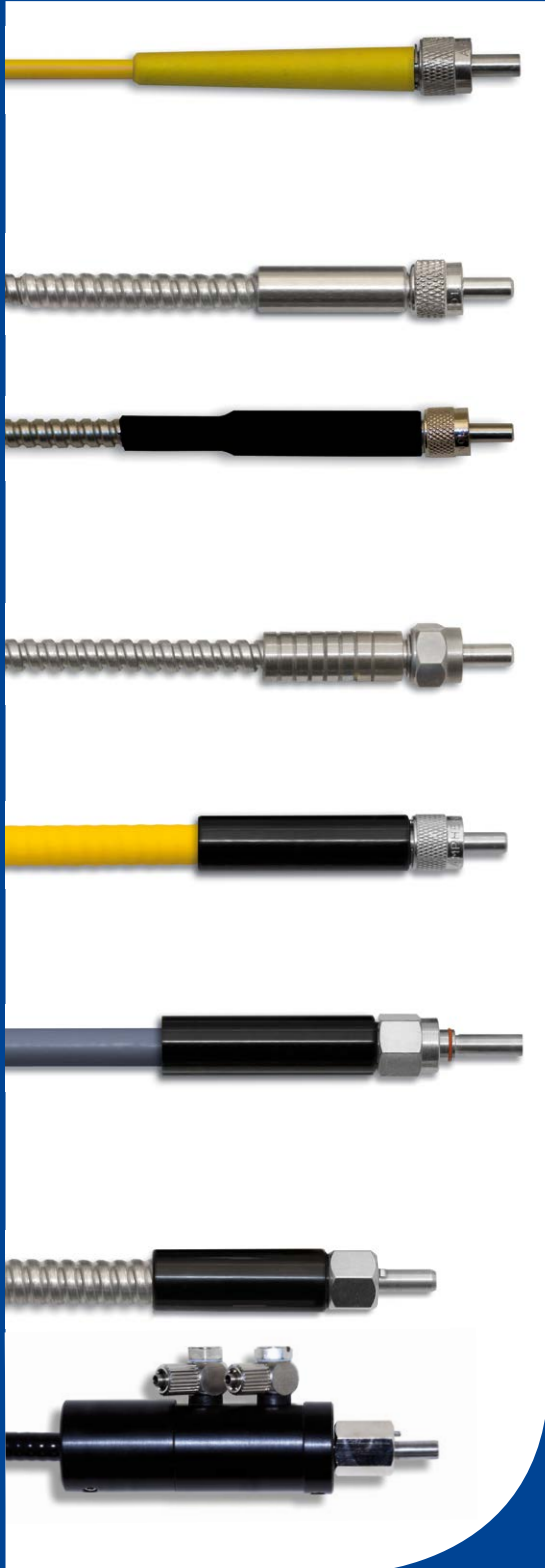
Metal coatings (aluminum, gold, silver)



**We manufacture
optical components and
parts from glass, sapphire
and crystals**



INDUSTRIAL LASER CABLE SYSTEMS – ILCS



INDUSTRIAL SMA LASER CABLE SYSTEMS

SMA systems

ILCS-S05, ILCS-S05-free

SMA plugs, optionally free-standing,
with plastic jacket and bend protection, Kevlar strain relief

SMA systems with stainless steel jacket

ILCS-S05, ILCS-S05-free

SMA plugs, optionally fiber free-standing,
stainless steel jacket

SMA systems with electrical insulation

ILCS-S05i, ILCS-S05-free-i

SMA plugs, optionally fiber free-standing, stainless steel
jacket, electrically insulated

SMA systems hexagonal SP

ILCS-S05, ILCS-S05-free

SMA plugs, optionally fiber free-standing, stainless steel
jacket, sleeve with grooves for special fastening, hexagon nut

SMA systems SP

ILCS-S05-free, SMA plugs, fiber free-standing,
stainless steel jacket with yellow plastic coating, aluminum
sleeve, fiber inserted in plug without adhesive

SMA systems hexagonal with sealing ring

ILCS-S05DR, SMA plug, with sealing ring,
aluminum sleeve, hexagon nut,
Stainless steel jacket with silicone coating

INDUSTRIAL HIGH-POWER LASER CABLE SYSTEMS D80

HPLC systems D80

HPLC-D80

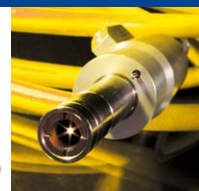
FD80 plugs, metal hose, fiber free-standing, optionally with
anti-twist protection, mode strip, water-cooled

REPAIR SERVICE – LASER CABLES

We repair all laser cable systems.

Ask for our repair service.

LLK-A / LLK-B / Laser Caps
(protective windows)



MEDICAL LASER CABLE SYSTEMS – MFLCS

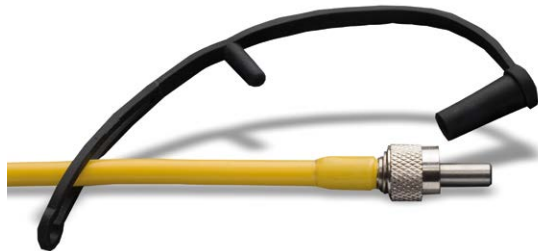


SMA laser cable systems standard

MFLCS-S05

MFLCS-S05free

SMA plugs, optional fiber free-standing, (S05-free),
with silicone hose and bend protection



Autoclavable

SMA laser cable systems – AC

MFLCS-S05-AC

MFLCS-S05-free-AC

SMA plugs, optional fiber free-standing, (S05-free),
with silicone hose and bend protection



SMA systems with gripping sleeve

MFLCS-S05

MFLCS-S05free

SMA plugs, optional fiber free-standing,
with silicone hose and band protection,
gripping sleeve



We develop and manufacture customized laser cables and
fiber-optic probes and applicators as well as plug systems
on request.



ACCESSORIES, CONNECTING FLANGES



4-hole flange for SMA cable,

4-hole flange, standard

4-hole flange, with anti-twist protection



Connecting sleeve

for fiber/fiber coupling;

SMA, FC-PC, ST

suitable for quartz glass fibers Ø 100 to 1,200 µm

All materials and components are bio-compatible. All laser
cable systems can be delivered optionally ETO-sterilized.
Individual packaging according to customer's wishes.



ALUMINUM OXIDE-BASED IR CONVERTER SCREEN

IR CONVERTER 1064

This active IR converter serves to visualize laser radiation and has been developed especially for long life and high destruction threshold.

- Great homogeneity in laser radiation performance
- High destruction threshold
- Active both sides

IR CONVERTER 1064

IR converter screen for visualization of laser radiation. Suitable for adjusting optical radiation and mode image control. For laboratory and industry.

Application

- Nd:yag laser
- 100 W/cm² to 2300 W/cm²
- Response sensitivity 70 W/cm
- Emission green
- Destruction threshold 2,700/cm²
- Active area 50 x 40 mm (both sides) thickness 6 mm





YOUR GLOBAL PARTNER

save time and money



Aufbau von Geschäftsaktivitäten in Advanced Technologies, Laser- und Medizintechnik / Life Science, in der Photonik und Optik. Business Development, Projekt- Qualitätsmanagement, Consulting und Coaching insbesondere für die Industriebereiche Photonics, Optics, Fiber optics, Laser- und Medizintechnik.



Developpement des activités professionnelles dans la branche des technologies avancées, technologie laser. Gérance des projets et contrôle de la qualité, consultation et coaching spécialisée dans les branches de l'optique, fibre et de la technologie laser et médicale.



Structure of business activity in Advanced Technologies, Laser Technology, Life Science and Photonics. Business Development, Project and Quality Management, Consulting and Coaching especially for Industry Sector Photonics, Optics, Fiber Optics, Laser- and Medical Technology.



Your Consultant | Dieter W. Frank

- ✓ **Consulting**
- ✓ **Business Development**
- ✓ **Internationales Netzwerk**
- ✓ **Kompetenzteam**
- ✓ **Smart Solutions**

Management Professional, Founder and CEO/CTO, Consultant with advanced knowledge in general management disciplines, CEO for financial, personnel and business development in a high technology business field. Experience in sales, marketing, strategy, direction of teams.

bdlp CONSULTING
ADVANCED TECHNOLOGIES



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BUSINESS DEVELOPMENT

Project Management

Quality Management

Supplier Management

Interim Management

Start Up Management

bdlp ● ● ●

BUSINESS DEVELOPMENT

LASER-PHOTONICS

ENGINEERING

Components

Systems

Laser

Life Science

Photonics & Optics

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 **bdlp** One-stop supplier
SMART SOLUTIONS!