PRODUCT OVERVIEW

VISION SYSTEMS – LIGHTING – OPTICS

the easy way of machine vision
The value of seeing more
BAR LIGHTS
FOCUSED BAR LIGHTS
AREA LIGHTS
RING LIGHTS
DARK FIELD LIGHTS
DOME LIGHTS
SPOT LIGHTS
TELECENTRIC LIGHTS
VICOLUX® LIGHTING
THE BEST PRECONDITION FOR SHARP RESULTS

An imaging system can only recognise what is visible. The most intelligent algorithm for information processing remains worthless if the object concerned is not recognisable. Having the right lighting is the key.

Each task requires special illumination that fits the circumstances. Because all materials – whether glass, plastic, metal, liquids, paste-like substances or textile fabrics – possess absorbent, transmitting and reflective properties. Furthermore, they also have their own highly individual shapes and geometries.

In order to quickly and economically come up with an optimal solution for our customers we offer a broad range of lighting that meets a multitude of requirements and can create a lighting system that:

... Illuminates a diverse array of geometries (surface areas, rings, lines)
... Allows for various lighting conditions (e.g. directed, diffuse, parallel, shadow-free, focused, polarised)
... Allows for a great variety of lighting principles (bright field, dark field, incident light, transmitted light)
... Works with diverse wavelengths (from UV365 to IR950)
... Can be actuated in a broad variety of ways (switchable, pulsable and flashable, with adjustable brightness and flash times)
... Can be quickly and easily combined with each other and also with optics and cameras

The vicolux® high performance LED lighting from Vision & Control lives up to these demands. It is particularly distinguished by the high performance illumination and control electronics which, despite the systems’ compact design, are integrated. Vision & Control offers the right components for any lighting situation – completely uncomplicated. With trendsetting light generation, control and distribution that make visible precisely what needs to be recognised and processed.
ADVANTAGES/PROPERTIES

For over 20 years, Vision & Control has used the most powerful LEDs as light sources and is therefore able to offer the following:

HIGH RELIABILITY

- Stable light characteristics and long service life
- Integrated control units that are perfectly matched to the LEDs
- Rugged, industry compatible designs

MAXIMUM SPEED

- Rapid image evaluation based on homogeneous, high contrast images
- Short shutter speeds thanks to high efficiency illumination
- High process speeds due to powerflash control that is exact to the microsecond

REDUCED WORK AND INTEGRATION EFFORT

- Simple switching between continuous, pulsed and flash operation
- Quick set-up thanks to plug & play properties: Plug connectors, universal switch input, installation options, exchangeable accessories
- Electrically and mechanically combinable with optical components and vision systems
- Easy product selection thanks to our online catalogue and provision of all relevant technical data (CAD model, intensity distribution, etc.)

QUALITY AND SAFETY

- CE compliant components
- Tested photobiological safety, DIN EN 62471:2009-03
- Certification in accordance with 9001:2008

Vicolux® lighting reduces costs – from project planning to set-up, in ongoing operations and in maintenance.
BAR LIGHTS

APPLICATIONS

- Automotive
  - Presence control
  - Surface inspection
- Packaging industry
  - Printed image control
  - Position determination
- Electronics industry
  - Circuit path inspection
  - Solder spots monitoring

PROPERTIES

- Lengthwise illumination of the inspection area, using incident or transmitted light or focused on a line
- Homogeneous light with a high luminosity
- Simple adjustment of the light distribution to the respective process environment (using accessories)
- Electrical connection by means of standard plug connectors
- Virtually borderless illumination area
- Threaded holes for rotatable or fixed mounting
- Clamp adapters for variable fastening and the cascading of multiple bar lights

LIGHTING PRINCIPLE

DIFFUSE (LDL/LDLF SERIES)
Homogeneous illumination of the inspection area in incident or transmitted light

DIRECTED (LAL SERIES)
Powerful illumination of the inspection area in incident light

CONTINUOUSLY DIRECTED (LLL SERIES)
Directed homogeneous illumination of the inspection area by means of integrated special optics

ELECTRONIC VERSIONS

- PLUG & PLAY
- ADJUSTABLE LIGHTING
- WITHOUT INTEGRATED CONTROL UNIT

SCANNING OF A MATT-GLOSS ALUMINIUM SURFACE

LEFT
Homogeneous but dark (diffuse)

CENTRE
Bright but only pointwise (directed)

RIGHT
Continuous bright line (continuously directed)
CONSTRUCTION DESIGNS

2-sided and 4-sided lighting
- Bar lighting with 4-sided bracket in radiating position from bright to dark field, individually adjustable
- Suitable for the 7 series and 14 series

FOCUSED BAR LIGHTS
- See following page for description

ACCESSORIES

CABLE
- Suitable for all series (exception: LAL30 series and LDL30 series have an open connecting cable)

POWER SUPPLY
- Suitable for all series

POLARISERS
- Influence the direction of propagation of the light waves, prevent interfering reflections on the test object
- Suitable for all series

CONSTRUCTION DESIGNS

7 series and 14 series with integrated controller
7 series and 14 series with separate controller
30 series and 60 series with integrated controller

WAVELENGTHS

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LUMINOUS FIELD SIZES

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7 and 14 series
- Lengths from 25 to 500 mm* (in 25 mm increments)

30 and 60 series
- Lengths from 120 to 600 mm* (in 60 mm increments)

(*) Special lengths upon request

CONSTRUCTION DESIGNS

7 series and 14 series with integrated controller
7 series and 14 series with separate controller
30 series and 60 series with integrated controller

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FOCUSED BAR LIGHTS

SERIES

... ZAL

... ZAL-SPO

APPLICATIONS

... Packaging industry
  . Printed image control
  . Edge detection of endless material/roll goods

... Solar industry
  . Inspection for microcracks

... Textile industry
  . Examining the fabric structure

... Glass industry
  . Foreign object detection in plate glass

PROPERTIES

... Ideal for line-scan camera applications
... High luminosity focused on a thin line
... Also suitable for incident light and transmitted light applications in bright field
... Passive cooling

LIGHTING PRINCIPLE

INCIDENT LIGHT (ZAL SERIES)
Powerful illumination of the inspection area

TRANSMITTED LIGHT (ZAL-SPO SERIES)
Powerful illumination of the inspection area

ELECTRONIC VERSIONS

- PLUG & PLAY
- ADJUSTABLE LIGHTING
- WITHOUT INTEGRATED CONTROL UNIT

INSPECTION OF A GLOSSY METAL SURFACE

LEDs reflect on the surface

The light is focused on a thin line by means of focused bar lighting
You can easily configure your own individual bar lighting from the bar lighting items of the LAL7 and LLL7 series. You can mount a rod lens in front of the bar lighting using a bracket. They are available in various lengths and diameters. The lens is height-adjustable. With this the focal position can be changed. Consequently, a host of lighting scenarios are possible. This lighting combination can even be fitted into the most confined installation location, thanks to its very compact dimensions.
AREA LIGHTS

SERIES

- AL
- DL
- FAL
- FALRL
- FALKD
- FDL
- FDLRL
- FDLKD
- FAL modular
- FDL modular

APPLICATIONS

- Food industry
  - Positional determination
  - Completeness control
- Glass industry
  - Side wall inspection of hollow glass
  - Contaminants in plate glass
- Automotive
  - Presence and position control
  - Measurement tasks

PROPERTIES

- Extensive range of tiny (30 x 30 mm) to very large-area standard lighting systems (180 x 240 mm)
- Modular area illumination in freely configurable sizes of up to 120 m edge length
- Camera view possible
- Light and compact designs, suitable for installation on moving machine parts

LIGHTING PRINCIPLE

DIFFUSE
Homogeneous illumination of the inspection area in incident light

DIFFUSE
Homogeneous illumination of the inspection area in transmitted light

DIRECTED
Powerful illumination of the inspection area in incident light

ELECTRONIC VERSIONS

- PLUG & PLAY
- ADJUSTABLE LIGHTING
- WITHOUT INTEGRATED CONTROL UNIT
CONSTRUCTION DESIGNS

AL AND DL SERIES
- Compact, borderless, lightweight unit
- Illumination area size corresponds to the outer dimensions
- Integrated controller
- Mounting holes M3
- Easy set-up thanks to M5 plug

FAL AND FDL SERIES
- Scratchproof light-emitting surface made of glass
- Stable border with M6 mounting holes
- Lighting with camera view possible (FALKD and FDLKD series)
- Mounted (see Fig.) or separate controller (EPF or EC versions)

FALRL AND FDLRL SERIES
- Compact, borderless, light-weight unit with plastic light-emitting surface
- Mounting holes M3
- Mounted or separate controller (EPF or EC versions, see Fig.)

FAL AND FDL MODULAR SERIES
- Scratchproof light-emitting surface made of glass
- Stable border with M6 mounting holes
- Illumination area can be freely defined with a grid of 30 x 30 mm
- Optionally with camera view (see Fig.)

ACCESSORIES

CABLE
- Coaxial mirror lighting
  - Diffuse light incidence that strikes the test object parallel to the optical axis of the camera system
  - Suitable for DL30x30 and DL60x60 series with mounting adapter and beam splitter unit (STE series)

WAVELENGTHS

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- Available ● on request ○

NOTE

For the 60x90 model, Fresnel lenses, diffusers and polarisers are also available as accessories

LUMINOUS FIELD SIZES

Modular area illumination:
- max. illumination area 30 x 1200 mm
- or 100 modules (1 module = 30 x 30 mm illumination area)
RING LIGHTS

APPLICATIONS

... Automotive
  - Read codes and characters
  - Positional determination of components
  - Inspect attributes
... Semiconductor industry
  - Positional determination of fiducial markers
  - Solder point inspection
... Food industry
  - Contour and shape control
  - Check and read identity codes

PROPERTIES

... Powerfully illuminating coaxial universal lighting for incident light applications
... Compact design with integrated controller
... Extensive accessories for quick and easy adapting of the light direction to the inspection task
... It is possible to combine different illumination area sizes with one another so that, for example, you have a 3-channel RGB light source or a round planar light with camera view

LIGHTING PRINCIPLE

DIRECTED
Coaxial incident light (without accessories)

DIRECTED, FOCUSED
Focusing of the light rays through a Fresnel lens

DIFFUSE
Homogeneous illumination without interfering reflections by attaching diffusers

ELECTRONIC VERSIONS

- PLUG & PLAY
- ADJUSTABLE LIGHTING
- WITHOUT INTEGRATED CONTROL UNIT

INSPECTION OF CIRCUIT BOARD COATED WITH LACQUER

LEFT
Reflections predominate on the components

RIGHT
Suppression of all reflective surfaces by means of light and lens polarisation when extinguishing (polarised ring light)
**WAVELENGTHS**

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- ● Available
- ○ on request

**OUTER AND INNER DIAMETERS**

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**ACCESSORIES**

**CABLE**
- Available in various lengths, optionally with angled plug connectors for easy set-up
- Suitable for RK2036, RK3652, RK5268

**MOUNTING ADAPTOR**
- For mounting directly on the lenses
- Suitable for all series

**DIFFUSERS**
- Diffuser discs in different intensities
- Homogeneous light, no disruptive reflections
- Suitable for all series

**FRESNEL LENSES**
- For focusing or defocusing on a specific area to be illuminated
- Suitable for all series

**POLARISERS**
- Influences the direction of propagation of the lightwaves
- Prevents interfering reflections on the test object
- Suitable for all series
DARK FIELD LIGHTS

SERIES
... RR19/8 ... RR30/23 ... RR3950 ... RR64/22

APPLICATIONS
... Automotive
  . Detection of surface flaws
  . Reading of embossed codes and characters
... Electronics industry
  . Solder point inspection
  . Positional determination
... Metalworking industry
  . Embossing control
  . Inspection of cut and stamped edges

PROPERTIES
... Ring-shaped, radial LEDs
... Due to the lighting properties (lighting principle), the lighting is located very close to the object
... Even the smallest bumps and pits become visible

LIGHTING PRINCIPLE

With dark field array, only the light rays deflected to the surface structure are directed into the lens and camera. For this, the light source is always located close above the object.

ELECTRONIC VERSIONS
- PLUG & PLAY
- ADJUSTABLE LIGHTING
- WITHOUT INTEGRATED CONTROL UNIT

READING OF LASER MARKINGS ON SEMICONDUCTORS

LEFT
Recording with targeted area illumination

RIGHT
Dark field array
**WAVELENGTHS**

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</tr>
</tbody>
</table>

*Available* ○ on request

**TIP**

With the bar lighting of the 7 series and 14 series, you can attain the desired illumination area size for your individual inspection task. The bar lights are mounted in a 4-sided bracket to form a square dark field. The opposite sides can be selected in lengths from 25 mm to 250 mm.

**ILLUMINATION AREA DIMENSIONS**

- 19 mm
- 8 mm
- 30 mm
- 23 mm
- 64 mm
- 22 mm

**FOUR-SIDED ILLUMINATION FOR DARK FIELD APPLICATIONS**

- Bar lighting of the 7 series and 14 series with external controllers
- +
- 4-sided bracket
DOME LIGHTS

SERIES
... SFD30/9 ... SFD42/12 ... RD3950 ... SF64

APPLICATIONS
... Glass industry
  - Inspecting the mouths of hollow glass
  - Inspecting bottle bases
... Automotive
  - Surface inspection
  - Presence control
... Pharmaceutical
  - Checking and reading identification codes
  - Inspection and position control of closing caps

PROPERTIES
... Shadow-free and homogeneous illumination of the inspection area with an extremely high luminosity (500 W/m²)
... Use of power LEDs
... Compact design height
... Also available in deep blue and infrared as standard

LIGHTING PRINCIPLE

SHADOW FREE INCIDENT LIGHT
The so-called “cloudy day” lighting produces an evenly distributed light from the half-space over the test object

FULL DOME
A coaxial mirror light is located between the camera/lens and dome. Advantage: the shadows that occur with extremely reflective surfaces are prevented by the camera view

ELECTRONIC VERSIONS

PLUG & PLAY
ADJUSTABLE LIGHTING
WITHOUT INTEGRATED CONTROL UNIT

TASK
Read characters on film label

LEFT
Disruptive reflections in diffuse light

RIGHT
Suppression of disruptive reflections by means of dome lighting

LEFT
Camera view of the dome lighting causes shadows to form in the marked area

RIGHT
Equal illumination of the marked area by extending the dome lighting with a coaxial mirror light (full dome)
**WAVELENGTHS**

<table>
<thead>
<tr>
<th>Light colour</th>
<th>Ultraviolet</th>
<th>Visible light</th>
<th>Infrared</th>
</tr>
</thead>
<tbody>
<tr>
<td>365 nm</td>
<td>●</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>395 nm</td>
<td>●</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>405 nm</td>
<td>●</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>470 nm</td>
<td>●</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>515 nm</td>
<td>●</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>580 nm</td>
<td>●</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>617 nm</td>
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<td>○</td>
<td>●</td>
</tr>
<tr>
<td>633 nm</td>
<td>●</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>640 nm</td>
<td>●</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>650 nm</td>
<td>●</td>
<td>○</td>
<td>●</td>
</tr>
</tbody>
</table>

● Available  ○ on request

**ACCESSORIES**

**CABLE**
- Available in various lengths, optionally with angled plug connectors for easy set-up
- Suitable for SFD30/9 and SFD42/12

**FULL DOME**
- Beam splitter unit STE30x30 or STE60x60 in combination with the DL30x30 or DL60x60 area lights
- Suitable for SFD30/9 and SFD42/12

**ILLUMINATION AREA DIAMETER**

- Full dome: 128 mm
- Cable: 60 mm
SPOT LIGHTS

SERIES

... ULS6 ... RAL10 ... SPOT50

APPLICATIONS

... Pharmaceutical
  - Recognition and reading of diverse codes
  - Presence and completeness control

... Automotive
  - Targeted illumination for presence control of small components in large assemblies (fitting)
  - Light direction in the working area of robots

... Semiconductor industry
  - Positional determination of fiducial markers
  - Read codes and characters

PROPERTIES

... LED light source produces a focused spot of light for working distances of up to two metres
... High luminosity power even at considerable object distances
... Small and light (22 g) spot light source, suitable for mounting on moving machine parts, e.g. a robot arm
... Integrated focusing optics for adjusting illumination area and working distance

LIGHTING PRINCIPLE

DIRECTED
Focused, targeted illumination of the inspection area

ELECTRONIC VERSIONS

- PLUG & PLAY
- ADJUSTABLE LIGHTING
- WITHOUT INTEGRATED CONTROL UNIT
**WAVELENGTHS**

<table>
<thead>
<tr>
<th>Series</th>
<th>Light Colour</th>
<th>Ultraviolet</th>
<th>Visible Light</th>
<th>Infrared</th>
</tr>
</thead>
<tbody>
<tr>
<td>ULS6</td>
<td></td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>RAL10</td>
<td></td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>SPOT50</td>
<td></td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

- Available
- On request

**ACCESSORIES**

- **CABLE**
  - Available in various lengths, optionally with angled plug connectors for easy set-up
  - Suitable for RAL10/ULS6

- **DIFFUSERS**
  - Diffuser discs in different intensities
  - Homogeneous light, no disruptive reflections
  - Use as extremely bright transmitted light
  - Suitable for RAL10

- **SPOTLIGHT ADAPTER**
  - The ULS6 light direction is adaptable by means of front lens and C-mount lens
  - Suitable for ULS6

- **POLARISERS**
  - Influences the direction of propagation of the lightwaves
  - Prevents interfering reflections on the test object
  - Suitable for RAL10

**ILLUMINATION AREA DIAMETER**

- WD: Working distance
TELECENTRIC LIGHTS

SERIES

... TZB10
... TZB30
... TZB51
... TZB60
... TZB95
... TZB130

APPLICATIONS

... Glass industry
  . Edge and foreign object detection
  . Shape control
... Medical technology
  . Inspection of miniature components and structures
... Pharmaceutical
  . High precision measurement tasks
... Automotive
  . Control of the dimensional accuracy and outer contour
  . Threading inspection

PROPERTIES

... Directed light source with parallel light direction
... For use in combination with telecentric lenses
... Illumination area diameters are attuned to the telecentric lenses of the vicotar® brand
... Suitable for flash operation in the microsecond range
... Highest precision measurement of reflective and transparent objects

LIGHTING PRINCIPLE

TELECENTRIC TRANSMITTED LIGHT
The telecentric lighting is located behind the test object

ELECTRONIC VERSIONS

- PLUG & PLAY
- ADJUSTABLE LIGHTING
- WITHOUT INTEGRATED CONTROL UNIT

READING OF THE INNER BORDER MARKING ON A BLU-RAY DISC

With diffuse incident lighting no embossing is visible

The embossing on the Blu-Ray is recognisable thanks to telecentric incident lighting
### WAVELENGTHS

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>TZB10</td>
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<td>TZB30</td>
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<tr>
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<tr>
<td>TZB130</td>
<td>●</td>
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</table>

- ●: Available
- ○: on request

### COMBINED LIGHTING

#### TELECENTRIC INCIDENT LIGHT
- Beam splitter unit of the STE30 and STE60 series

### LUMINOUS FIELD DIAMETERS

- \( \varnothing \text{10 mm} \) - \( \text{130 mm} \)

### ACCESSORIES

#### SAFETY GLASSES AND POLARISING FILTER
- Protect the front lens against contamination and mechanical influence
- Suitable for all series
PRODUCT OVERVIEW

VISION SYSTEMS – LIGHTING – OPTICS

the easy way of machine vision