Why Banner Vision Lighting

With over ten years of lighting experience Banner is been committed to developing new and innovative solutions, delivering products of the highest quality, fulfilling the needs of each customer, and operating with honesty and integrity. Banner’s expanding offering of vision lights help you:

- **Reduce Labor Costs**
- **Improve Accuracy and Quality**
- **Increase Production Rate**
Optimizing Image Quality

To optimize image quality, a dedicated light source should be used in any vision application. Dedicated lighting:

• Optimizes contrast between the target object or feature and its background,
• Provides uniform lighting conditions that allow image capture to be unaffected by ambient lighting in the factory environment, and
• Simplifies image analysis by creating high contrast between the “good” and the “bad” feature of interest

LED illumination has become the universal standard for machine vision. It is reliable, requires minimal maintenance, is easy to assemble and comes in a variety of colors, or wavelengths, such as red, blue, green, IR and UV.

In addition to identifying the correct type of illumination, ensuring that the light is consistent for every single measurement is critical in ensuring repeatable measurements.

Factors affecting consistency of illumination:

• Age of light
• Variations in lighting and camera exposure
• Temperature of the light
• Variations in drive to the light
• Ambient light
• Timing of pulsed lighting
Choosing the Right Color

In addition to choosing the right lighting technique, different wavelengths of light can also be used to create additional contrast, draw out features of interest, or reduce the visibility of insignificant features.

Infrared (IR) Light

Infrared (IR) light can be used to hide insignificant features by reducing the contrast of certain objects. For example, some types of ink that appear dark in the visible spectrum reflect large amounts of IR light. In these cases, ink may disappear in a grayscale image—an effect that can be used to hide certain insignificant features.

Ultraviolet (UV) Light

Ultraviolet (UV) light can be used to draw out features of interest when there is very little contrast from the background, such as beads of clear adhesive on a part. Shining UV light on the adhesive may create a glowing effect (fluorescence) that makes the adhesive stand out clearly from the background.
<table>
<thead>
<tr>
<th>Lighting Techniques</th>
<th>What the Camera Sees</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backlights</td>
<td><img src="image1.png" alt="Backlights Image" /></td>
<td>The part being inspected is placed between the camera and a bright, even light source. The result creates a silhouette of the target which is useful in edge detection, part presence and measurement applications.</td>
</tr>
<tr>
<td>Ring Lights</td>
<td><img src="image2.png" alt="Ring Lights Image" /></td>
<td>A ring light is affixed to the camera and both items can be mounted as one piece for convenience. This setup is good for relatively small parts or close up applications.</td>
</tr>
<tr>
<td>Low Angle Ring Lights</td>
<td><img src="image3.png" alt="Low Angle Ring Lights Image" /></td>
<td>Also called a dark field illuminator, this specialty light has its LEDs mounted in a ring, pointing toward the part almost perpendicular to the camera's direction of view. Low Angle Ring lights create shadows and bright spots to detect changes in depth.</td>
</tr>
<tr>
<td>Directional Lights</td>
<td><img src="image4.png" alt="Directional Lights Image" /></td>
<td>Directional lights, in whatever style, create shadows to detect changes in depth, illuminate specific surface angles, and avoid glare of reflective surfaces when directed at an angle away from lens.</td>
</tr>
<tr>
<td>On-Axis Lights</td>
<td><img src="image5.png" alt="On-Axis Lights Image" /></td>
<td>On-axis, or coaxial, lights generate light that travels along the same axis as the camera's direction of view. The camera looks down from the top, through the On-Axis light, to the target part below. This technique can be use to eliminate shadows, inspect shiny object or inspect for height changes.</td>
</tr>
<tr>
<td>Structured Lights</td>
<td><img src="image6.png" alt="Structured Lights Image" /></td>
<td>A laser line generator is an example of a structured lighting scheme. This technique uses a high quality, uniform laser line to infer the presence of a difficult to see target. As a three-dimensional part passes through the laser line's path, the image of the laser becomes distorted so the camera can detect the part.</td>
</tr>
<tr>
<td>Heavy Duty Lights</td>
<td><img src="image7.png" alt="Heavy Duty Lights Image" /></td>
<td>Our portfolio of heavy duty lights includes products suitable for use in washdown environments, hazardous locations, and high temperature applications. We offer a variety of waterproof devices that are resistant to common cleaning chemicals, as well as products that are resistant to cutting oils and fluids.</td>
</tr>
</tbody>
</table>

* * *
Lighting Techniques

What the Camera Sees

**Backlights**
The part being inspected is placed between the camera and a bright, even light source. The result creates a silhouette of the target which is useful in edge detection, part presence and measurement applications.

**Ring Lights**
A ring light is affixed to the camera and both items can be mounted as one piece for convenience. This setup is good for relatively small parts or close up applications.

**Low Angle Ring Lights**
Also called a dark field illuminator, this specialty light has its LEDs mounted in a ring, pointing toward the part almost perpendicular to the camera's direction of view. Low Angle Ring lights create shadows and bright spots to detect changes in depth.

**Directional Lights**
Directional lights, in whatever style, create shadows to detect changes in depth, illuminate specific surface angles, and avoid glare of reflective surfaces when directed at an angle away from lens.

**On-Axis Lights**
On-axis, or coaxial, lights generates light that travels along the same axis as the camera's direction of view. The camera looks down from the top, through the On-Axis light, to the target part below. This technique can be use to eliminate shadows, inspect shiny object or inspect for height changes.

**Structured Lights**
A laser line generator is an example of a structured lighting scheme. This technique uses a high quality, uniform laser line to infer the presence of a difficult to see target. As a three-dimensional part passes through the laser line's path, the image of the laser becomes distorted so the camera can detect the part.

**Heavy Duty Lights**
Our portfolio of heavy duty lights includes products suitable for use in washdown environments, hazardous locations, and high temperature applications. We offer a variety of waterproof devices that are resistant to common cleaning chemicals, as well as products that are resistant to cutting oils and fluids.
Backlights

- Creates silhouette for maximum contrast
- Determines the shape and size of target objects
- Offers a highly diffused surface and uniform brightness, with lower intensity than other lights
- Provides the most robust lighting for measuring and gauging
- Highlights through-holes in target objects
Standard Backlights

Example Model Number: LEDRB75X150PW2-XQ

<table>
<thead>
<tr>
<th>Light</th>
<th>Color</th>
<th>Type of Light</th>
<th>Lighted Area Size (mm)</th>
<th>Housing</th>
<th>Window</th>
<th>Relative Intensity</th>
<th>Intensity Adjustment</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED</td>
<td>R</td>
<td>B</td>
<td>75x150</td>
<td>P</td>
<td>W</td>
<td>2</td>
<td>X</td>
<td>Q</td>
</tr>
</tbody>
</table>

- B = Backlight
- P = Plastic
- W = White Plastic
- Q = 5-pin M12/Euro QD
- QD models require a mating cordset

Example Model Number: LEDRLB145XW6-XQ

<table>
<thead>
<tr>
<th>Light</th>
<th>Color</th>
<th>Type of Light</th>
<th>Lighted Area (mm)</th>
<th>Housing</th>
<th>Window</th>
<th>Relative Intensity</th>
<th>Intensity Adjustment</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED</td>
<td>R</td>
<td>LB</td>
<td>145</td>
<td>X</td>
<td>W</td>
<td>6</td>
<td>X</td>
<td>Q</td>
</tr>
</tbody>
</table>

- B = Blue (475 nm, ±5 nm)
- G = Green (525 nm, +10/-5 nm)
- I = Infrared (850 nm)
- R = Red (625 nm, ±5 nm)
- W = White (6500 K, +600/-500 K)
- Q = 5-pin M12/Euro QD
- QD models require a mating cordset

Supply Voltage: 24 V DC

White Lux @ 0 m:
- Standard: 45,000 Lux
- Bar: 52,000 Lux

Construction:
- Standard: Black Valox™ housing; acrylic window
- Bar: Black anodized aluminum; acrylic window

Operating Temperature:
- 0 to +50 °C (+32 to +122 °F)

Environmental Rating:
- Standard: IEC IP67
- Bar: IEC IP50

Useful Life:
- Standard: B50/L50 Lifetime > 100,000 hours (Infrared, Red)
- B50/L50 Lifetime > 90,000 hours (Blue, Green, White)
- Bar: When operated within specifications, output will decrease less than 30% after 50,000 hours

Strobing/Control:
- Continuous or strobed operation

Certifications:
- 3TJJ IND. CONT. EQ.
Ring Lights

- Easy integration between camera and light
- Brightly illuminates from a small form factor
- Mounts directly to the camera and centers the light on the image
- Brightly illuminates small objects
- Reduces shadows on images with protrusions
## Ring Lights

**Example Model Number:** LEDRR70XD5-XQ

<table>
<thead>
<tr>
<th>Light</th>
<th>Color</th>
<th>Type of Light</th>
<th>Size (mm)</th>
<th>Housing</th>
<th>Window</th>
<th>Relative Intensity</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED</td>
<td>R</td>
<td>Ring Light</td>
<td>70</td>
<td>X</td>
<td>D</td>
<td>5</td>
<td>Q</td>
</tr>
</tbody>
</table>

- **B** = Blue (470 nm, ±5 nm)
- **G** = Green (525 nm, +10/-5 nm)
- **I** = Infrared (850 nm)
- **R** = Red (625 nm, ± 5 nm)
- **W** = White (6500 K, +600/-500 K)
- **UV395** = UV (395 nm, +5/-0 nm)

**R** = Not sealed

**D** = Diffused clear plastic

**X** = Fixed

**P** = Potentiometer

**Q** = 0.15 m 5-pin M12/Euro Pigtail QD

**M** = 0.3 m cable with 3-pin M8/Pico connector

QD models require a mating cordset

### Specifications

- **Supply Voltage:** 24 V DC
- **White Lux @ 0.5 m:** 5,150 lux
- **Construction:** Housing: Black anodized aluminum
  Window: Acrylic
- **Operating Temperature:** 0 to +50 °C (+32 to +122 °F)
- **Environmental Rating:** IP50

When operated within specifications, output will decrease less than 30% after 50,000 hours for visible and IR models; 20,000 hours for UV models

- **Useful life:** Continuous or strobed operation

### Example Model Number:

LEDRR70XD5-XQ
Low-Angle Ring Lights

- Illuminates from an angle nearly perpendicular to object
- Emphasizes surface irregularities such as dust, dents, scratches and other surface defects
- Highlights slight height differences such as etching, solder balls and embossing
Low-Angle Ring Lights

Example Model Number: LEDRI1503M

Supply Voltage: 24V DC

Construction:
Housing: aluminum with black anodizing

Operating Temperature: 0 to +50 °C (+32 to +122 °F)

Useful life:
When operated within specifications, output will decrease less than 20% after 20,000 hours and less than 30% after 30,000 hours (based on continuous operation)

Strobing/Control:
Continuous or strobed operation

Certifications:

<table>
<thead>
<tr>
<th>Light</th>
<th>Color</th>
<th>Type of Light</th>
<th>Size (mm)</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED</td>
<td>R</td>
<td>I = Low Angle Ring Light</td>
<td>150 = ø 150</td>
<td>3M = 2 m cable with 3-pin M8/Pico connector</td>
</tr>
</tbody>
</table>

| I = Infrared (880 nm) |
| R = Red (640 nm) |

192.5 mm

25.8 mm

ø 127.0 mm
Directional Lights

- Provides even illumination in a concentrated area
- Creates shadows or glare to detect changes in depth, depending on mounting
- A wide variety of directional light styles are available including: Bar, Area, and Spot to fit the specific application needs
- High-intensity lighting for distances greater than 300 mm
### Bar Light

**Example Model Number:** LEDRLA290XD6XQ

<table>
<thead>
<tr>
<th>Light</th>
<th>Color</th>
<th>Type of Light</th>
<th>Lighted Length (mm)</th>
<th>Housing</th>
<th>Window</th>
<th>Relative Intensity</th>
<th>Intensity Adjustment</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED</td>
<td>R</td>
<td>LA</td>
<td>290</td>
<td>X</td>
<td>D</td>
<td>X = Not sealed</td>
<td>6 - X</td>
<td>Q</td>
</tr>
</tbody>
</table>

**LA = Linear Array**

- **B** = Blue (475 nm, ±5 nm)
- **G** = Green (525 nm, ±10/-5 nm)
- **I** = Infrared (850 nm)
- **R** = Red (625 nm, ±5 nm)
- **W** = White (6500 K, +600/-500 K)
- **UV365** = UV (395 nm, +5/-0 nm)*
- **UV395** = UV (395 nm, +5/-0 nm)

**P** = Plastic clear
**Q** = 5-pin M12/Euro Integral QD
**PH** = Pot & 0-10 V Analog wire (Strobe polarity = Low)
**PL** = Pot & 0-10 V Analog wire (Strobe polarity = High)

**QD models require a mating cordset**

---

**Supply Voltage**

- **24 V DC**
  - White: 23,420 lux @ 1160 mm Lux @ 0.5 m

**Construction**

- Black anodized aluminum

**Operating Temperature**

- 0 to +50 °C (+32 to +122 °F)

**Environmental Rating**

- IEC IP50

**Useful life**

- When operated within specifications, output will decrease less than 30% after 50,000 hours for visible and IR models; 20,000 hours for UV models

**Strobing/Control**

- Continuous or strobed operation

**Certifications**

- UL Listed

---

**Array Length**

<table>
<thead>
<tr>
<th>Array Length</th>
<th>&quot;L&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>145 mm</td>
<td>171 mm</td>
</tr>
<tr>
<td>290 mm</td>
<td>316.5 mm</td>
</tr>
<tr>
<td>435 mm</td>
<td>462 mm</td>
</tr>
<tr>
<td>580 mm</td>
<td>607.5 mm</td>
</tr>
<tr>
<td>870 mm</td>
<td>898.5 mm</td>
</tr>
<tr>
<td>1160 mm</td>
<td>1189.5 mm</td>
</tr>
</tbody>
</table>

* UV365 can only be used with glass window
** Intensity adjustment not available on 145 mm length
## Area Light

Example Model Number: LEDRA70XD5-Q

<table>
<thead>
<tr>
<th>Light</th>
<th>Color</th>
<th>Type of Light</th>
<th>Size (mm)</th>
<th>Housing</th>
<th>Window</th>
<th>Relative Intensity</th>
<th>Intensity Adjustment</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED</td>
<td>R</td>
<td>A</td>
<td>70</td>
<td>X</td>
<td>D</td>
<td>5 - X</td>
<td>X</td>
<td>Q</td>
</tr>
</tbody>
</table>

- **B** = Blue (475 nm, ±5 nm)
- **G** = Green (525 nm, +10 nm/-5 nm)
- **I** = Infrared (850 nm)
- **R** = Red (625 nm, ±5 nm)
- **W** = White (6500 K, +600/-500 K)
- **UV395** = UV (395 nm, +5/-0 nm)

**A** = Area Light

<table>
<thead>
<tr>
<th>X = Not sealed</th>
</tr>
</thead>
</table>

- **D** = Diffused clear plastic

**Q** = 5-pin M12 Euro integral QD

- **M** = 2 m cable with 3-pin M8/Pico connector

**QD** models require a mating cordset

### Supply Voltage
24 V DC

### White Lux @ 0.5 m
7,030 lux

### Construction
- Housing: Black anodized aluminum
- Window: Acrylic

### Operating Temperature
0 to +50 °C (+32 to +122 °F)

### Environmental Rating
IEC IP50

### Useful life
When operated within specifications, output will decrease less than 30% after 50,000 hours for visible and IR models; 20,000 hours for UV models

### Strobing/Control
Continuous or strobed operation

---

- [CE](#)
- [UL](#)
- [CN]
**Spot Light**

**Example Model Number:** LEDRSS0L5-XQ

<table>
<thead>
<tr>
<th>Light</th>
<th>Color</th>
<th>Type of Light</th>
<th>Angle</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED</td>
<td>R</td>
<td>S50 = Spot</td>
<td>L5 = ± 5° (smaller, more focused)</td>
<td>XQ = 5-pin M12/Euro integral QD</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L11 = ± 11° (larger spot for all but IR models)</td>
<td>Blank = 2 m integral Cable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L14 = ± 14° (larger spot for IR models only)</td>
<td>GD models require a mating cordset</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L20 = ± 20° (largest spot for all but IR models)</td>
<td></td>
</tr>
</tbody>
</table>

- **Supply Voltage:** 12 to 30 V DC
- **White ±5° Lux @ 0.5 m:** 3,500 Lux
- **Construction:** Black anodized aluminum
- **Operating Temperature:** −20 to +50 °C (−4 to +122 °F)
- **Environmental Rating:** IEC IP67, IP69K per DIN 40050-9
- **Useful life:** When operated within specifications, output will decrease less than 30% after 50,000 hours for visible and IR models; 20,000 hours for UV models
- **Strobing/Control:** Continuous or strobed operation
- **Certifications:**
  - CE
  - UL
  - US LISTED

---

BANNER
Coaxial Lights

- Provides more uniform illumination than a ring light
- Delivers collimated illumination in the same optical path as camera
- Evenly illuminates flat reflective surfaces
- Features models with anti-reflective glass dust covers
Coaxial Light

Example Model Number: LEDRO100M

<table>
<thead>
<tr>
<th>Light</th>
<th>Color</th>
<th>Type of Light</th>
<th>Size (mm)</th>
<th>Cover</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED</td>
<td>R</td>
<td>O = On-Axis Light</td>
<td>100 = 100 x 100</td>
<td>M</td>
<td>Blank = 0.6 m Sable with 3-pin M8/Pico Connector</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50 = 50 x 50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Supply Voltage**: 24 V DC
- **White Lux @ 0.5 m**
  - 50 mm: 70 Lux
  - 100 mm: 350 Lux
- **Construction**
  - Housing: aluminum with black anodizing
  - Beam Splitter: optical glass with optical coatings on both sides
  - Diffuser: high-precision cast acrylic
  - Dust Cover: optical glass with broadband anti-reflective coating (425 nm to 675 nm) (some models)
- **Operating Temperature**: 0 to +50 °C (+32 to +122 °F)
  - When operated within specification, output will decrease less than 20% after 10,000 hours and less than 30% after 20,000 hours
- **Useful Life**
- **Strobing/Control**: Continuous or strobed operation
- **Certifications**

---

### 50 mm Models

- 50 mm: 109.9 mm x 59.8 mm x 59.3 mm

### 100 mm Models

- 100 mm: 190.3 mm x 147.8 mm x 114.5 mm

---

CE listed...
Lights for Industrial Environments

- Washdown LED Lights are sealed, smooth, and durable enough to handle the most intense applications.
- Housing options include nickel plated aluminum, 316 stainless steel or plastic bodies with multiple window options.
- Illuminates small to large areas with an even pattern of light and no shadows.
Sealed Bar Light
Example Model Number: LEDRLA290AD6-XQ

<table>
<thead>
<tr>
<th>Light</th>
<th>Color</th>
<th>Type of Light</th>
<th>Lighted Length (mm)</th>
<th>Housing</th>
<th>Window</th>
<th>Relative Intensity</th>
<th>Intensity Adjustment</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED</td>
<td>R</td>
<td>LA</td>
<td>290</td>
<td>A</td>
<td>D</td>
<td>6</td>
<td>X Fixed</td>
<td>Q</td>
</tr>
</tbody>
</table>

LA = Linear Array

A = Nickel-plated Aluminum
SS = 316 Stainless Steel

P = Plastic clear
G = Glass clear
D = Diffused clear plastic

Q = 5-pin M12 Euro Integral QD
QD models require a mating cordset

* UV365 can only be used with glass window

** Array Length “L”

<table>
<thead>
<tr>
<th>Array Length</th>
<th>“L”</th>
</tr>
</thead>
<tbody>
<tr>
<td>290 mm</td>
<td>328 mm</td>
</tr>
<tr>
<td>435 mm</td>
<td>474 mm</td>
</tr>
<tr>
<td>580 mm</td>
<td>621 mm</td>
</tr>
</tbody>
</table>

** B = Blue (475 nm, ±5 nm)
** G = Green (525 nm, +10/-5 nm)
** I = Infrared (850 nm)
** R = Red (625 nm, ±5 nm)
** W = White (6500 K, +600/-500 K)
** UV365 = UV (365 nm, +5/-0 nm)*
** UV395 = UV (395 nm, +5/-0 nm)

** Construction
Nickel-plated aluminum or 316 stainless steel

** Operating Temperature
0 to +50 °C (+32 to +122 °F)

** Environmental Rating
IEC IP68

** Useful life
When operated within specifications, output will decrease less than 30% after 50,000 hours for visible and IR models; 20,000 hours for UV models

** Strobing/Control
Continuous or strobed operation

** Certifications
UL, cUL, CE, TUV, Inmetro, RoHS
Sealed Area Light
Example Model Number: LEDRA70AD5-XQ

<table>
<thead>
<tr>
<th>Light</th>
<th>Color</th>
<th>Type of Light</th>
<th>Size (mm)</th>
<th>Housing</th>
<th>Window</th>
<th>Relative Intensity</th>
<th>Intensity Adjustment</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED</td>
<td>R</td>
<td>A</td>
<td>70</td>
<td>A</td>
<td>D</td>
<td>5</td>
<td>X</td>
<td>Q</td>
</tr>
</tbody>
</table>

A = Area Light

P = Plastic clear
G = Glass clear
D = Diffused clear plastic

X = Fixed
P = Potentiometer
Q = 5-pin M12 Euro Integral QD

QD models require a mating cordset

*B: Blue (475 nm, ±5 nm)
G: Green (525 nm, +10/-5 nm)
I: Infrared (850 nm)
R: Red (625 nm, ±5 nm)
W: White (6500 K, +600/-500 K)
UV365: UV (365 nm, +5/-0 nm)*
UV395: UV (395 nm, +5/-0 nm)

Supply Voltage
24 V DC

White Lux
18,550 Lux

Construction
Nickel-plated aluminum or 316 stainless steel

Operating Temperature
0 to +50 °C (+32 to +122 °F)

Environmental Rating
IEC IP68

Useful life
When operated within specifications, output will decrease less than 30% after 50,000 hours for visible and IR models; 20,000 hours for UV models

Strobing/Control
Continuous or strobed operation

Certifications

* UV365 can only be used with glass window
WLC60 Heavy-Duty Light

Example Model Number: WLC60XW340GAQ

<table>
<thead>
<tr>
<th>Light</th>
<th>Cascadable</th>
<th>LED Color</th>
<th>Lighted Length (mm)</th>
<th>Window</th>
<th>Mounting Type</th>
<th>Construction</th>
<th>Connector Exit</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLC60</td>
<td>X</td>
<td>W</td>
<td>340</td>
<td>G</td>
<td>Blank = Polycarbonate</td>
<td>Blank = Base Mount</td>
<td>Blank = Side Exit</td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R</td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

G = Cascadable
X = Non-Cascadable

W = Cool White (6200 K, +300/-200 K)**
WW = Warm White (3000 K, +200/-100 K)
R = Red (625 nm, ±5 nm)
G = Green (525 nm, +10/-5 nm)
B = Blue (475 nm, ±5 nm)
Y = Yellow (590 nm, ±5 nm)

A = Nickel-Plated Aluminum
SS = 316 Stainless Steel

Q = 2 m Integral Cable
QD = 4-pin M12 Euro Integral QD

QD models require mating cordset

* Cascading not available for stainless steel models
** Stainless steel models only available in cool white
† Rear exit and stainless steel models available in 340 mm length only

Supply Voltage
12 to 30 V DC

White 640 nm
Lux @ 0.5 m
8,925 Lux

Construction
Housing: Nickel-plated aluminum or 316 Stainless steel
Window: Polycarbonate or Borosilicate Glass

Operating Temperature
-40 °C to +50 °C (−40 °F to +122 °F) at the max. intensity setting
-40 °C to +70 °C (−40 °F to +158 °F) at any of the dim settings

Environmental Rating
IEC IP67, JIS C IP68G, IP69K per DIN 40050-9

Useful Life
When operating within specifications, output will decrease less than 30% after 60,000 hours

Strobing/Control
Strobing is unavailable, however, certain models have PWM functionality that can act as strobing

Please visit our website for more information.

Certifications

![Diagram of Rush, Standard, and Cascadable models with dimensions: 367.0 mm, 339.9 mm or 638.9 mm, 30.8 mm, 31.3 mm, 60.9 mm, 52.3 mm, 20.5 mm, 21.0 mm.]
## WLC90 Heavy-Duty Light

**Example Model Number:** WLC90WGL15Q

<table>
<thead>
<tr>
<th>Family</th>
<th>LED Color</th>
<th>Window</th>
<th>Lensing</th>
<th>Connector Exit</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLC90</td>
<td>W</td>
<td>G</td>
<td>L15</td>
<td>Blank</td>
<td>Q</td>
</tr>
</tbody>
</table>

- **W** = Cool White (6200 K, +300/-200 K)
- **G** = Polycarbonate
- **L15** = ± 15°
- **Blank** = Side Exit
- **Q** = 4-pin M12 Euro Integral QD
- **R** = Rear Exit
- **L8** = ± 8°
- **L30** = ± 30°

### Specifications
- **Supply Voltage**: 12 to 30 V DC
- **White ±8° Lux @ 0.5 m**: 22,348 Lux
- **Construction**: Housing: Nickel-plate aluminum
  Window: Polycarbonate or borosilicate glass
- **Operating Temperature**: -40 to +70 °C (-40 to +158 °F)
- **Environmental Rating**: IEC IP67/IP68/IP69K per DIN 40050
- **Useful life**: When operating within specifications, output will decrease less than 30% after 60,000 hours
- **Strobing/Control**: Strobing is unavailable, however, certain models have PWM functionality that can act as strobing. Please visit our website for more information.
- **Certifications**: [UL] (Certified by Underwriters Laboratories)

### Model Numbers
- **WLC90WGL15Q**

### Dimensions
- **21.0 mm x 89.0 mm x 28.2 mm**
- **91.0 mm x 21.0 mm**

**QD models require mating cordset.**
### WLA Area Lights

**Example Model Number:** WLAIN105X180L11Q

<table>
<thead>
<tr>
<th>Family</th>
<th>LED Color</th>
<th>Array Size (mm)</th>
<th>Window</th>
<th>Lensing</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLA</td>
<td>W</td>
<td>105X180</td>
<td>Blank</td>
<td>L11</td>
<td>Q</td>
</tr>
</tbody>
</table>

**Supply Voltage**: 12 to 30 V DC

**White 360 x 180 mm ±11° Lux @ 0.5 m**: 21,000 Lux

**Construction**
- Housing: PBT
- Window: Acrylic or polyurethane
- Connector: Nickel-plated brass or PVC-jacketed cable

**Operating Temperature**: -20 to +50 °C (-4 to +122 °F)

**Environmental Rating**
- Plastic: Rated IEC IP67 and IP69K, per DIN 40050
- Polyurethane: Rated IEC IP67, IEC IP68, IP69K per DIN 40050

**Strobing/Control**
- Strobing is unavailable, however, certain models have PWM functionality that can act as strobing.
- Please visit our website for more information.

**Certifications**
- Encapsulated models not UL listed

- **Encapsulated models only available in cool white with no lenses**
WL50S Spot Light
Example Model Number: WL50SWL.5Q

Supply Voltage
12 to 30 V DC

White ±5º
Lux @ 0.5 m
3,500 Lux

Construction
Housing: Black anodized aluminum or Stainless Steel with FDA-grade silicone gasket and Viton® o-ring seal Window: Polycarbonate or glass window Connector: Nickel-plated QD connector or PVC-jacketed cable Mounting Nut: Black zinc-plated steel or Stainless Steel

Operating
Temperature
-20 to +50 °C (-4 to +122 °F)

Environmental Rating
IEC IP67/IP68g/IP69K per DIN 40050

Certifications

LED

Family
WL50S

Color
W
Blank = Black Anodized Aluminum
SS = Stainless Steel

Housing
Window
Material
Blank = Acrylic
G = Glass*

Lens
Angle
L5 = ±5º (small)
L11 = ±11º (large)
L20 = ±20º (largest)

Connector
Q = 4-pin M12 Euro Integral QD
QD models require mating cordset

* Only available on stainless steel models
** Only available on anodized aluminum models

*Only available on stainless steel models
**Only available on anodized aluminum models

Ø 50 mm
65.8 mm
37.8 mm
14.8 mm

Ø 56 mm
71.1 mm
44.9 mm
15 mm
Structured Lights

• Provides more uniform illumination than a ring light
• Delivers collimated illumination in the same optical path as camera
• Evenly illuminates flat reflective surfaces

LLG660P10A60II
Laser Line Generator
660 nm, 10 mW, 60 degree fan angle, Class II CDRH, 0.5 m cable with flying leads
Accessories

Brackets

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMBBSSM</td>
<td>Used with Area Lights &amp; Backlights</td>
</tr>
<tr>
<td>SMBAMS70A</td>
<td>Used with Area Lights</td>
</tr>
<tr>
<td>SMBAMS70AS</td>
<td>Used with Sealed Area Lights</td>
</tr>
<tr>
<td>SMBLASRA</td>
<td>Used with Bar Lights</td>
</tr>
<tr>
<td>SMBLAXRA*</td>
<td>Used with Bar Lights</td>
</tr>
<tr>
<td>SMBLAXU*</td>
<td>Used with Bar Lights</td>
</tr>
</tbody>
</table>

*Use SMBLAXRA and SMBLAXU to create swivel bracket

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMB30A</td>
<td>Used with Spotlights</td>
</tr>
<tr>
<td>SMB30SC</td>
<td>Used with Spotlights</td>
</tr>
<tr>
<td>SMB30FA</td>
<td>Used with Spotlights</td>
</tr>
<tr>
<td>SMBAMS30P</td>
<td>Used with Spotlights</td>
</tr>
<tr>
<td>SMB30MM</td>
<td>Used with Spotlights</td>
</tr>
<tr>
<td>SMBAMS30RA</td>
<td>Used with Spotlights</td>
</tr>
<tr>
<td>SMBBSRA</td>
<td>Used with WLA</td>
</tr>
<tr>
<td>SMBWLAMAG</td>
<td>Used with WLA</td>
</tr>
</tbody>
</table>

Cordsets

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMBWLC60F</td>
<td>Used with WLC60</td>
</tr>
<tr>
<td>LMBWLC60RA</td>
<td>Used with WLC60</td>
</tr>
<tr>
<td>LMBWLC60RAS</td>
<td>Used with WLC60</td>
</tr>
<tr>
<td>LMBWLC60MAG</td>
<td>Used with WLC60</td>
</tr>
<tr>
<td>LMBWLC90PT</td>
<td>Used with WLC90</td>
</tr>
<tr>
<td>SMBAMS70AS</td>
<td>Used with WLC90</td>
</tr>
</tbody>
</table>

Nickel-Plated Nut

<table>
<thead>
<tr>
<th>Model</th>
<th>Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MQDC20-506</td>
<td>2 (6.5')</td>
</tr>
<tr>
<td>MQDC20-515</td>
<td>5 (15')</td>
</tr>
<tr>
<td>MQDC20-530</td>
<td>9 (30')</td>
</tr>
</tbody>
</table>

Stainless Steel Nut

<table>
<thead>
<tr>
<th>Model</th>
<th>Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MQDC20SS-506</td>
<td>2 (6.5')</td>
</tr>
<tr>
<td>MQDC20SS-515</td>
<td>5 (15')</td>
</tr>
<tr>
<td>MQDC20SS-530</td>
<td>9 (30')</td>
</tr>
</tbody>
</table>

3-Pin Pico-Style

<table>
<thead>
<tr>
<th>Model</th>
<th>Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PKG3M-5</td>
<td>5 (16')</td>
</tr>
<tr>
<td>PKG3M-7</td>
<td>7 (23')</td>
</tr>
<tr>
<td>PKG3M-10</td>
<td>10 (33')</td>
</tr>
</tbody>
</table>

Pico-Style Double-Ended

<table>
<thead>
<tr>
<th>Model</th>
<th>Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PKG3M-35-PSG3M</td>
<td>0.35 (1')</td>
</tr>
<tr>
<td>PKG3M-2-PSG3M</td>
<td>2 (6.5')</td>
</tr>
</tbody>
</table>

4-Pin M12/Euro-Style

<table>
<thead>
<tr>
<th>Model</th>
<th>Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MQDC-406</td>
<td>2 (6.5')</td>
</tr>
<tr>
<td>MQDC-415</td>
<td>5 (15')</td>
</tr>
<tr>
<td>MQDC-430</td>
<td>9 (30')</td>
</tr>
</tbody>
</table>

5-Pin

<table>
<thead>
<tr>
<th>Model</th>
<th>Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MQDC-506</td>
<td>2 (6.5')</td>
</tr>
<tr>
<td>MQDC-515</td>
<td>5 (15')</td>
</tr>
<tr>
<td>MQDC-530</td>
<td>9 (30')</td>
</tr>
</tbody>
</table>

4-Pin M12/Euro-Style

<table>
<thead>
<tr>
<th>Model</th>
<th>Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MQDC-0406</td>
<td>2 (6.5')</td>
</tr>
<tr>
<td>MQDC-0415</td>
<td>5 (15')</td>
</tr>
<tr>
<td>MQDC-0430</td>
<td>9 (30')</td>
</tr>
</tbody>
</table>

5-Pin

<table>
<thead>
<tr>
<th>Model</th>
<th>Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MQDC-0506</td>
<td>2 (6.5')</td>
</tr>
<tr>
<td>MQDC-0515</td>
<td>5 (15')</td>
</tr>
<tr>
<td>MQDC-0530</td>
<td>9 (30')</td>
</tr>
</tbody>
</table>

4-Pin M12/Euro-Style

<table>
<thead>
<tr>
<th>Model</th>
<th>Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODEC-01SS-PUR</td>
<td>0.3 (1')</td>
</tr>
<tr>
<td>MODEC-033S-PUR</td>
<td>1 (3')</td>
</tr>
<tr>
<td>MODEC-040SS-PUR</td>
<td>2 (6.5')</td>
</tr>
</tbody>
</table>

Pico-Style Splitter

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSB-UNT213M831F1241</td>
<td>Straight connector models listed. One 3-pin Pico QD and one 4-Pin Euro QD.</td>
</tr>
<tr>
<td></td>
<td>Branches = 0.3 m (1ft) Trunk = Flying leads</td>
</tr>
</tbody>
</table>

*† Enables strobe signal from P4 while obtaining power from an external source |

Pico-Style Splitter

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSB-M831M831</td>
<td>Straight connector models listed</td>
</tr>
<tr>
<td></td>
<td>Branches = 0.20 m (0.65 ft) Trunk = 0.20 m (0.65 ft)</td>
</tr>
</tbody>
</table>

*† Powers 2 lights from one P4 sensor
<table>
<thead>
<tr>
<th>Use With</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear Plastic</td>
<td>Models</td>
</tr>
<tr>
<td>70 mm Sealed IP68 High-Intensity Area Lights</td>
<td>LEDA70SW-G</td>
</tr>
<tr>
<td>145 mm IP50 Bar Lights</td>
<td>LEDLA145XW-G</td>
</tr>
<tr>
<td>290 mm IP50 Bar Lights</td>
<td>LEDLA290XW-G</td>
</tr>
<tr>
<td>290 mm Sealed IP68 Bar Lights</td>
<td>LEDLA290SW-G</td>
</tr>
<tr>
<td>435 mm IP50 Bar Lights</td>
<td>LEDLA435XW-G</td>
</tr>
<tr>
<td>435 mm Sealed IP68 Bar Lights</td>
<td>LEDLA435SW-G</td>
</tr>
<tr>
<td>580 mm IP50 Bar Lights</td>
<td>LEDLA580XW-G</td>
</tr>
<tr>
<td>580 mm Sealed IP68 Bar Lights</td>
<td>LEDLA580SW-G</td>
</tr>
<tr>
<td>870 mm IP50 Bar Lights</td>
<td>LEDLA870XW-G</td>
</tr>
<tr>
<td>1160 mm IP50 Bar Lights</td>
<td>LEDLA1160XW-G</td>
</tr>
<tr>
<td>Clear Plastic Diffuse</td>
<td>Models</td>
</tr>
<tr>
<td>70 mm Sealed High-Intensity Area Lights</td>
<td>LEDA70SW-P</td>
</tr>
<tr>
<td>145 mm IP50 Bar Lights</td>
<td>LEDLA145XWDW-P</td>
</tr>
<tr>
<td>290 mm IP50 Bar Lights</td>
<td>LEDLA290XWDW-P</td>
</tr>
<tr>
<td>290 mm Sealed IP68 Bar Lights</td>
<td>LEDLA290SWDW-P</td>
</tr>
<tr>
<td>435 mm IP50 Bar Lights</td>
<td>LEDLA435XWDW-P</td>
</tr>
<tr>
<td>435 mm Sealed IP68 Bar Lights</td>
<td>LEDLA435SWDW-P</td>
</tr>
<tr>
<td>580 mm IP50 Bar Lights</td>
<td>LEDLA580XWDW-P</td>
</tr>
<tr>
<td>580 mm Sealed IP68 Bar Lights</td>
<td>LEDLA580SWDW-P</td>
</tr>
<tr>
<td>870 mm IP50 Bar Lights</td>
<td>LEDLA870XWDW-P</td>
</tr>
<tr>
<td>1160 mm IP50 Bar Lights</td>
<td>LEDLA1160XWDW-P</td>
</tr>
</tbody>
</table>

**Use With Models**

<table>
<thead>
<tr>
<th>Use With</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear Glass</td>
<td>Models</td>
</tr>
<tr>
<td>70 mm Sealed IP68 High-Intensity Area Lights</td>
<td>LEDA70SW-G</td>
</tr>
<tr>
<td>145 mm IP50 Bar Lights</td>
<td>LEDLA145XW-G</td>
</tr>
<tr>
<td>290 mm IP50 Bar Lights</td>
<td>LEDLA290XW-G</td>
</tr>
<tr>
<td>290 mm Sealed IP68 Bar Lights</td>
<td>LEDLA290SW-G</td>
</tr>
<tr>
<td>435 mm IP50 Bar Lights</td>
<td>LEDLA435XW-G</td>
</tr>
<tr>
<td>435 mm Sealed IP68 Bar Lights</td>
<td>LEDLA435SW-G</td>
</tr>
<tr>
<td>580 mm IP50 Bar Lights</td>
<td>LEDLA580XW-G</td>
</tr>
<tr>
<td>580 mm Sealed IP68 Bar Lights</td>
<td>LEDLA580SW-G</td>
</tr>
<tr>
<td>870 mm IP50 Bar Lights</td>
<td>LEDLA870XW-G</td>
</tr>
<tr>
<td>1160 mm IP50 Bar Lights</td>
<td>LEDLA1160XW-G</td>
</tr>
<tr>
<td>White Plastic</td>
<td>Models</td>
</tr>
<tr>
<td>70 x 70 mm Red Backlights</td>
<td>LEDBW</td>
</tr>
<tr>
<td>70 x 70 mm Infrared Backlights</td>
<td>LEDBIW</td>
</tr>
<tr>
<td>85 x 220 mm Red Backlights</td>
<td>LEDBWL</td>
</tr>
<tr>
<td>85 x 220 mm Infrared Backlights</td>
<td>LEDBIWL</td>
</tr>
<tr>
<td>White Plastic Diffuse</td>
<td>Models</td>
</tr>
<tr>
<td>70 mm Sealed High-Intensity Area Lights</td>
<td>LEDA70SWDW-P</td>
</tr>
<tr>
<td>145 mm IP50 Bar Lights</td>
<td>LEDLA145XWDW-P</td>
</tr>
<tr>
<td>290 mm IP50 Bar Lights</td>
<td>LEDLA290XWDW-P</td>
</tr>
<tr>
<td>290 mm Sealed IP68 Bar Lights</td>
<td>LEDLA290SWDW-P</td>
</tr>
<tr>
<td>435 mm IP50 Bar Lights</td>
<td>LEDLA435XWDW-P</td>
</tr>
<tr>
<td>435 mm Sealed IP68 Bar Lights</td>
<td>LEDLA435SWDW-P</td>
</tr>
<tr>
<td>580 mm IP50 Bar Lights</td>
<td>LEDLA580XWDW-P</td>
</tr>
<tr>
<td>580 mm Sealed IP68 Bar Lights</td>
<td>LEDLA580SWDW-P</td>
</tr>
<tr>
<td>870 mm IP50 Bar Lights</td>
<td>LEDLA870XWDW-P</td>
</tr>
<tr>
<td>1160 mm IP50 Bar Lights</td>
<td>LEDLA1160XWDW-P</td>
</tr>
</tbody>
</table>
Vision Sensors

Robust yet easy-to-use self-contained vision sensors perform automated inspections that previously required costly and complex vision systems. The iVu and iVu Color Image Sensors are used to monitor parts for type, size, orientation, shape, location, and color or color variations. The device can be set up and monitored using an integrated or remote touchscreen or with a PC.

Smart Cameras

Banner’s free and easy-to-use Vision Manager Software provides a number of tools and capabilities that enable VE Series Smart Cameras to solve a wide range of vision applications, such as item detection, part positioning, feature measurement and flaw analysis. Available in resolutions up to 5 MP to solve a variety of applications.

Barcode Readers

Banner Engineering provides advanced barcode reading capabilities for traceability in a wide variety of industries. We offer rugged, reliable solutions that ensure quality, improve efficiency, and enable accurate inventory management.

Imager-based barcode readers reliably read 1D and 2D barcodes in any orientation. Banner Engineering offers code reading solutions that can reliably decode difficult-to-read, low quality, and damaged codes—as well as codes printed on highly reflective surfaces.

Vision Lenses

Vision products combine high-performance tools, intelligent features, and an intuitive user interface for automated inspection applications. The vision systems are easy to use and customizable for specific machines and tasks. Adding vision lenses to industrial applications enhances overall performance and provides accurate detection for a wide variety of vision applications.

Vision System Camera Bandpass Filters

Bandpass filters allow you to control what your camera is seeing with greater contrast and a higher transmission for a reduced cost when compared to the conventional interference filter. Ideal for LED or laser diode application use.
Additional sensors, indicator lights, cordsets, brackets, and other accessories available at bannerengineering.com
How to Reach Us

Global Sales and Support

Need additional assistance?

Banner has a network of more than 3,500 factory and field representatives around the world ready to help you. Our highly skilled application engineers and industry experts are ready to support you wherever you are. For a complete listing, go to bannerengineering.com and find your local Banner Representative.

To contact a Banner Engineer about your application, visit our website at www.bannerengineering.com