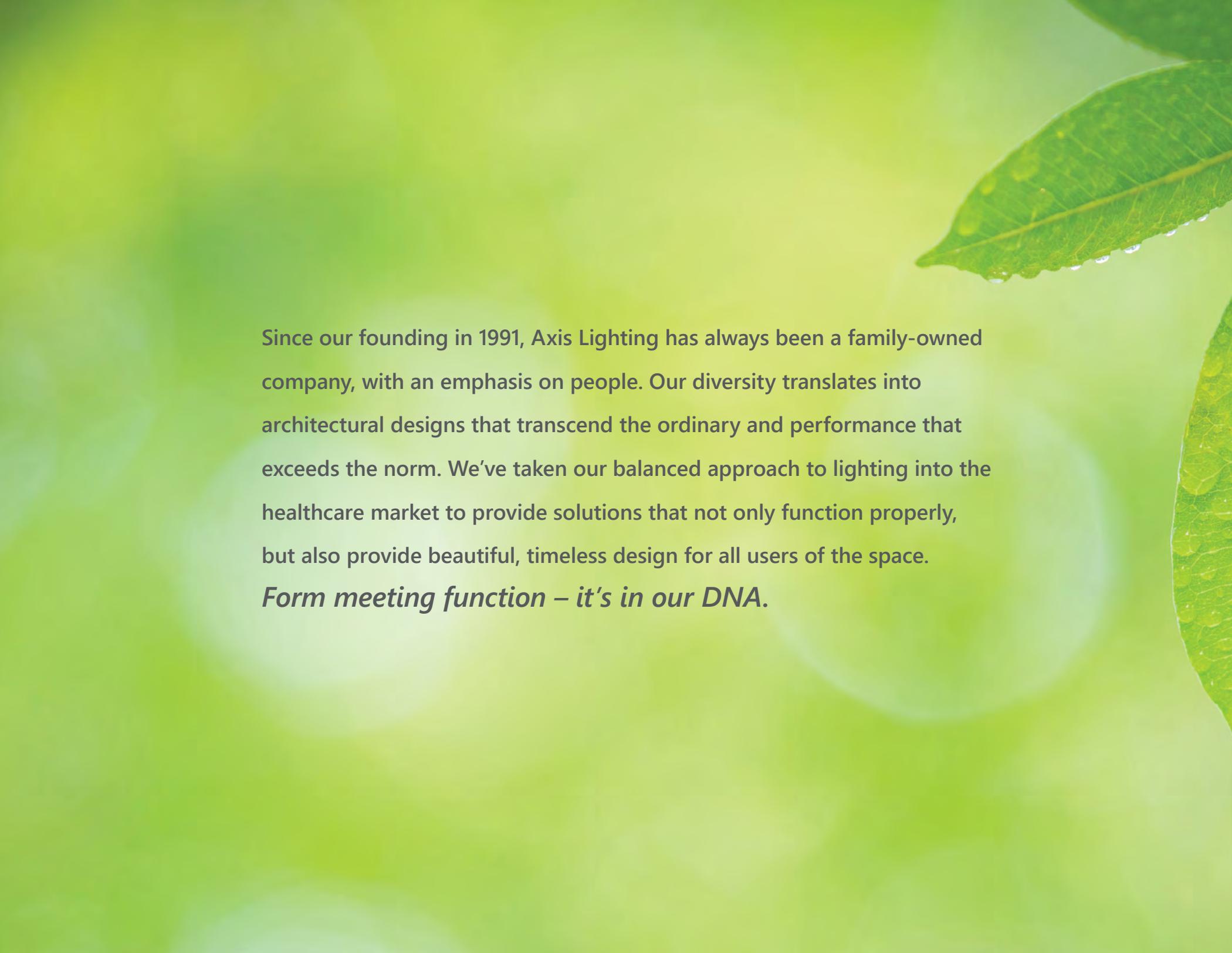




BalancedCare™ | PATIENT ROOM  
by axis



Since our founding in 1991, Axis Lighting has always been a family-owned company, with an emphasis on people. Our diversity translates into architectural designs that transcend the ordinary and performance that exceeds the norm. We've taken our balanced approach to lighting into the healthcare market to provide solutions that not only function properly, but also provide beautiful, timeless design for all users of the space.

*Form meeting function – it's in our DNA.*



## BalancedCare™ PATIENT ROOM

The patient room is multi-layered, demanding various lighting requirements for both the patient and staff. The lighting goal for the patient is to create a visually comfortable, glare-free environment that provides a natural 24-hour sequence of light for better sleep quality, safer navigation and overall healing. The lighting goal for the staff is the ability to perform multiple tasks under the proper lighting for the best care of the patient. Because of these objectives, healing environments should incorporate multiple options. From general ambient to exam, steplight to task functions — along with the sophistication of personal lighting control for patient comfort, and tailored solutions from white light to color tuning options for circadian entrainment — BalancedCare™ by Axis brings it all together.

# The BalancedCare™ Approach



Design for healthcare has been a tale of two extremes – offering either functional but institutional appearance, or extremely decorative forms while ignoring cleanability and other critical standards. The BalancedCare™ family by Axis Lighting ties it all together. BalancedCare provides lighting for wellness without trade-offs, offering patent-pending BeWell™ performance optics for both visual comfort and functionality, along with features that promote infection control and equipment compatibility. Finally – a product offering that addresses **ALL** the requirements of today's complex healthcare environment.

# BalancedCare™ Pillars



## WELLNESS

The built environment can have a positive effect on the overall state of a person's physical and emotional wellbeing. With a focus on patient and staff wellness, thoughtfully configured lighting that balances both visual and circadian needs, as well as links to nature, promotes healing outcomes.



## ARCHITECTURAL FORM

BalancedCare luminaires provide timeless, stylized forms concealing sophisticated technologies that complement and enhance today's architecture. Sleek, low profile styles replace mundane, institutional looks of the past and elevate healthcare lighting design to today's standards.



## FUNCTIONAL OPTICS & VISUAL COMFORT

BeWell light guide technology provides multiple precise distribution options to deliver the many layers of light required in healthcare environments, as well as glare-free comfortable lighting that supports the visual tasks of staff while enhancing the overall wellbeing of patients.



## INTELLIGENT CONTROL

BalancedCare is an intuitive 'controls-agnostic' collection with intelligent patient bed control compatibility, as well as wireless and POE; and spectral programmability provided by tunable white and BIOS SkyBlue® technologies. We partner with industry-recognized controls suppliers for integration into any building automation system.



## INFECTION CONTROL & PERFORMANCE

BalancedCare products are constructed of materials and finishes that withstand hospital cleaning protocols, standing up to the most stringent infection control requirements. They meet functional and application-specific industry listings such as UL, ADA, Ingress Protection (IP) and National Sanitation Foundation (NSF) standards.



## EASE OF MAINTENANCE

Smooth, non-corrosive surfaces can withstand the harsh cleaning protocols necessary to minimize risk of hospital-acquired infections (HAIs). Room-side access to drivers and components facilitates maintenance efforts, reduces costs, and prolongs sustainability of luminaire systems.





## BalancedCare™ TECHNOLOGIES

BalancedCare by Axis Lighting creates the required balance between innovation and patient/healthcare worker wellness. This is achieved by combining BeWell Optics™, BeWell Controls™ and BeSealed™ luminaire construction in the next generation of healthcare solutions.

BeWell light guide optics provides glare-free, comfortable lighting that supports the visual tasks of staff, and enhances the overall wellbeing of patients.

BeWell Controls is an intuitive, “controls-agnostic” approach with intelligent patient bed control compatibility, as well as wireless and POE; and spectral programmability provided by tunable white and BIOS SkyBlue® technologies.

BeSealed ties it all together with product design features that support easy maintenance and cleanability, that meet the most rigorous independent listings in the industry.



# Providing Multidimensional Distribution and Immersive Illumination



Precisely coded and aligned molecules in the light guide shape LED output, from individual points of light, in all three dimensions. The science is complicated. The result is easy – controlled distribution that puts light only where you need it. Direct, indirect, asymmetric or a combination with high efficacy performance, no matter the distribution.



Visual comfort takes on a whole new meaning. Instead of reflected glare, the unique light guide produces comfortably diffuse illumination for a more natural appearance. It matters most when placed in line of sight, like a bed light directly above the patient. That's where comfort is put to the test.

# Innovative Optical System Directs Light Where It's Needed — Comfortably

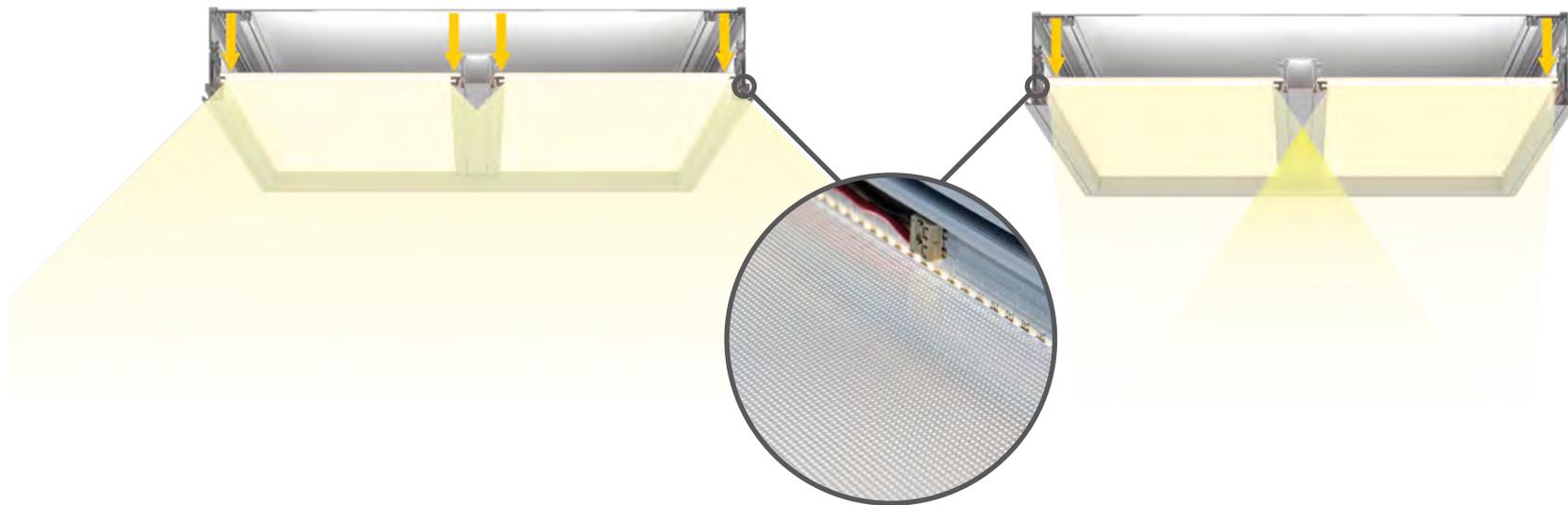
BeWell Optics delivers lighting that promotes a healing environment. BeWell is a patent pending, materials-based technology that uses molecular optics to direct - not reflect - light. The result is amazingly uniform distribution, without glare, shadowing, or pixelation. BeWell provides better visual acuity for tasks, and softer, healing visual comfort in the space.

## AMBIENT

BeWell Optics replaces traditional segmented reflectors to disperse the light uniformly across the entire lens.

## EXAM

In the same luminaire, BeWell optics balances concentrated higher intensity light for examination with softer ambient light.



## SEALED LIGHT GUIDE

Unique patent pending sealed light guide design, optimized for optics, infection control and multi-function controllability



GENERAL AMBIENT



READING



EXAM



NIGHT CHECK

**MULTIPLE LIGHT DISTRIBUTION OPTIONS**

Light guide technology with precision optics allows multiple distributions within the same luminaire dedicated to ambient, exam and reading functions

**UNIFORMITY**

BeWell Optics provides uniformly diffuse light without streaks, hot spots or shadows

**HEALTHCARE LIGHTING WITHOUT THE HARSHNESS**

Light-emitting area is comfortable to view, even in direct line of sight, as over a patient bed

**EFFECTIVE, EFFICIENT, AND EFFICACIOUS**

Better visual acuity means more effective care with high efficacy performance for all distributions

**CIRCADIAN-SUPPORTIVE LIGHT**

Intensity, spectrum and multi-directional distribution can be tailored to deliver light comfortably to the patient's eye, where that light cue is then transmitted to the body's master clock for circadian regulation

No more segmented reflectors in clunky housings... just beautiful, seamless optics switching between functions



**General Ambient** - a base layer of light for general conversation and circulation around the patient bed, which the patient can control from their remote pillow speaker or staff can control from a wall switch; light level and spectrum can be tailored to provide circadian stimulus



**Exam** - adds asymmetric beams of light to the ambient layer, delivering a higher intensity of uniformly distributed, high color rendering light onto the bed, to allow examination of the patient from head to toe; staff can control from wall switch at headwall and entry

## BeSealed Construction

All BalancedCare luminaires feature BeSealed design attributes that enable easier maintenance, less costly construction, updated lighting technology, and engineered features that support today's stringent infection control standards. BeSealed is the BalancedCare total mechanical solution.



Constructed of materials and finishes that can withstand harsh cleaning protocols, sealed to meet Ingress Protection (IP) and National Sanitation Foundation (NSF) requirements

One-piece gasket seals housing to optical cartridge

Plug-and-play drivers for easy replacement

Patent-pending sealed optical cartridge houses BeWell LED Optics

Modular cartridge is accessible from room-side

BalancedCare lightweight sealed housing technology eliminates complex and costly welded housing construction



Extruded aluminium housing maximizes LED heat dissipation to ensure cool operation and long life

#### LENS TOOL



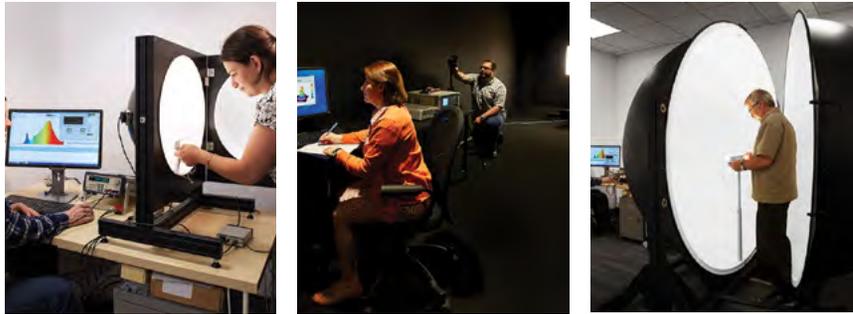
The lens tool seamlessly pulls the doorframe away from the housing and provides easy access to the internal electrical cartridge

#### TORSION SPRINGS



Torsion springs secure the doorframe to the housing, and ensure a tight seal without the use of exposed fasteners for aesthetics and cleanability

## BeWell Controls



When designing around BalancedCare luminaires, you get the support of Axis Lighting's robust electrical team of professional engineers who work towards proper integration and performance of control systems. Axis is agnostic with respect to controls and has partnered with industry recognized controls suppliers to support integrated lighting within healthcare environments, ranging from the nurse call system to the entire facility.

Successful lighting for healthcare includes the entire system — not only luminaires and controls — but also the physical switches and digital interfaces for the wide variety of building occupants. BeWell Controls supports the design team's controls intent, while advocating for maximum flexibility and friendly usability for patients and medical staff.

Long active on many of the healthcare and controls industry committees, our recognized domain experts are very familiar with research and best practices, which enables us to work with specialized healthcare design teams and adds value that consistently improves project outcomes for our customers.

Our in-house innovation specialists will help deliver everything from standard 0-10V dimming and code compliance to cutting edge Power Over Ethernet (POE) systems. Whether it's advanced IOT sensing for people and asset tracking, color technology for health and wellbeing, or other new use cases, the BalancedCare team understands and supports the complex healthcare environment.

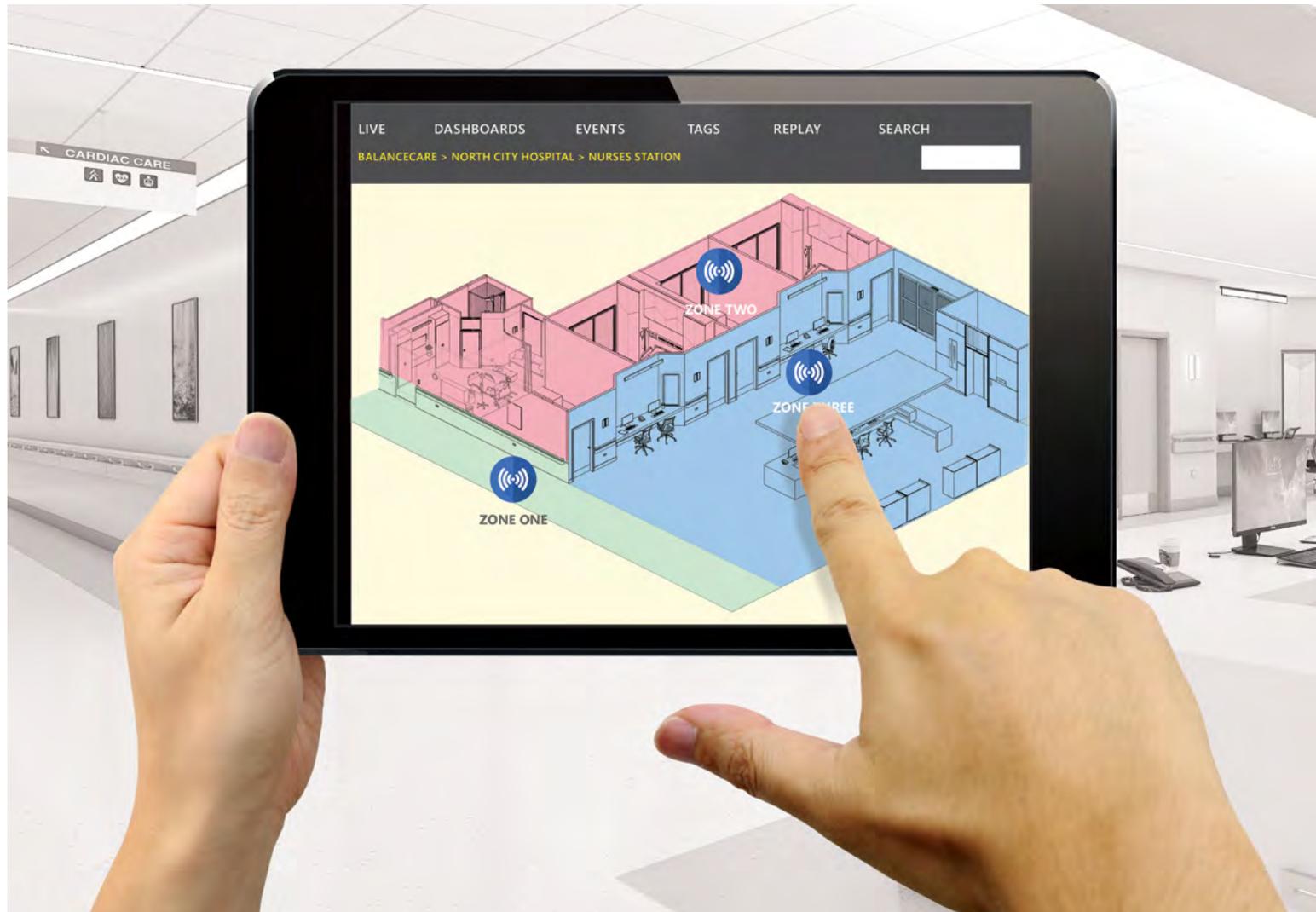


WIRELESS



PoE

Healthcare facilities are heavily regulated and undergo continuous maintenance, inspection and recertification to ensure 24/7 operation. BalancedCare luminaires can be integrated into the overall building automation network, allowing facilities managers to schedule lighting and other systems according to usage requirements, which is one way to simultaneously reduce costs and reduce a facility's carbon footprint.



Many of the BalancedCare products are available with Axis' Axitune color tunable technology, which provides spectral tuning and integration into an intelligent connected lighting system. The Axitune tunable color is a 4-channel system using DMX controls that delivers full spectrum light using five colors (royal blue, cyan, lime green, amber and red). Users can tailor brightness, CCT, saturation and hue to their desired preferences while maintaining great color consistency (<2 Standard Deviation Color Matching (SDCM)). Please consult the factory for product compatibility with Axitune Color Tuning technology.



Axis Cove Perfekt ceiling luminaires shown with Axitune color tuning.

Dynamic white lighting allows for tailored color mixing resulting in a wide range of CCTs to meet user’s changing needs and preferences. These systems offer visual comfort for all occupants, enable critical task performance for staff, and support both staff and patients’ circadian entrainment. The 2-channel systems allow users to independently adjust CCT and brightness to their desired effect, and dim along a constant linear dimming curve to 1%. Internal color mixing and proprietary BeWell Optics ensures the best in color uniformity and consistency. Please consult the factory for product compatibility with Axitune Tunable White technology.



**TUNABLE WHITE**



CCT Range	Ordering Code	Available CRI
2700K to 5000K	<b>TW2750</b>	80 or 90
2700K to 6500K	<b>TW2765</b>	80 or 90



### WELLNESS

Today's patient room challenges the most thoughtful designs: provide a welcoming, relaxed environment that promotes a sense of wellbeing, while equipping it to perform the most critical tasks and adhere to the most stringent standards. Lighting is the element that connects people to this environment – it affects performance, recovery, emotions and state of mind.



### FUNCTIONAL OPTICS & VISUAL COMFORT

Glare-free lighting is of paramount importance in a nurse's ability to function without distraction, and a patient's comfort and satisfaction for the duration of their stay. BeWell™ Optics enhances both patient and staff experience by providing seamless visual comfort with smooth transitions between functions. Combined with BeWell™ Controls, you have a layered system approach designed to work in concert with each other.



### INTELLIGENT CONTROL

Since patient room lighting is multifunctional due to the various tasks performed in these spaces, proper control of these functions is critical. BeWell™ Controls will ensure seamless integration between the lighting, control devices and users. Luminaires can also be sensor-ready to enable behaviors that not only enhance patient and staff experience, and improve quality of care, but serve to improve hospital efficiency as well.





### ARCHITECTURAL FORM

Sleek, low profile architectural forms that blend into the healing environment are a refreshing change from the mundane and institutional looks of many healthcare products today; they conceal the sophisticated features and state-of-the-art performance these luminaires provide.



### INFECTION CONTROL & PERFORMANCE

Sealed housings and optical media prevent transference of pathogens from patient room to plenum to help reduce risk of healthcare associated infections (HAIs). Ingress Protection (IP) ratings determine that fixtures are sealed against contaminants and the National Sanitation Foundation (NSF2) ratings assure cleanability. Look for the performance icons associated with each product



### EASE OF MAINTENANCE

Smooth, non-corrosive surfaces can withstand the harsh cleaning protocols necessary to minimize risk of healthcare associated infections (HAIs). Room-side access to drivers and components facilitates maintenance efforts, reduces costs, and prolongs sustainability of luminaire systems.



### Lighting Requirements

Today's patient rooms may convert from acute care to critical care in a matter of minutes. Lighting must accommodate diverse needs from enabling a nurse to evaluate a patient's condition by their skin coloration to assisting a surgeon who rushes in to perform an emergency procedure.

#### OVERBED GENERAL AMBIENT



**Ambient** – diffuse lighting for general conversation and movement around the patient bed, recommendation is 100-200 lux at floor for area surrounding bed, 4:1 avg:min uniformity.

#### OVERBED EXAM



**Exam** – requires excellent color rendering to evaluate a patient's condition; sufficiently high, uniform light levels focused on the bed area for examination of patients from head to foot. Provides recommended 500-1000 lux at 36" Above Finished Floor (AFF), 2:1 avg:min uniformity.

#### OVERBED READING



**Reading** – focused light onto a 45° incline plane, recommendation is 400-800 lux on horizontal when patient is in elevated reading position, 3:1 avg; min uniformity.

#### NIGHT CHECK



**Night check** – light levels dimmed low enough for staff to check on patients during the night without waking them from sleep, recommendation is 30 lux at 36" Above Finished Floor (AFF).

## Supplementary Lighting

Distinct functional modes deliver high quality lighting for a complex environment: These functions work independently or together to deliver light levels and distributions that align with recommended practice, designed to suit both patient and staff needs.

### STEPLIGHT



Reducing the risk of falls is one of the highest priorities in patient rooms. Low level steplights help patients safely navigate from bed to bathroom at night. Mounted at 18" Above Finished Floor (AFF), with 90° cutoff to minimize glare, they provide recommended low level illuminance of 4 lux.

### DECORATIVE SCONCE

Slim, soft-glow decorative sconces provide a soothing aesthetic, project less than 3" from the wall for ADA compliance and include an integral amber nightlight. They contribute to general ambient illuminance in any location.

### UNDERCABINET



Provides adjustable illuminance levels for day or night, selectable correlated color temperature (CCT), and touch-free controls for ease of operation and infection prevention. Recommended 500 lux, 3:1 avg:min uniformity on workplane.

### GENERAL AMBIENT



Families or visitors may spend an hour or overnight. Diffuse, glare-free lighting provides an atmosphere for conversation, casual seating, reading or working on a laptop; contributes to recommended 300 lux at 30" AFF, 3:1 avg:min uniformity.



## Multi-Function Overbed

Recessed 2' x 2' or 2' x 4' overbed luminaires with ambient, exam, and fixed angle reading. Axis Lighting's BeWell™ Optics delivers glare-free visual comfort with multi-functionality embedded into the light guide. These cleanable optics provide optimal illumination for examination and other medical tasks with soothing ambient illumination throughout the patient room.

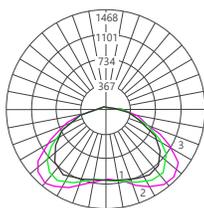
- BeWell™ light guide transitions from soft ambient to high powered exam to deliver multi-functional optics without segmented compartments, transition lines, or pixelation
- Reading light option: 3000K – 4000K
- Ambient and exam CCTs: 3000K – 4000K
- Tunable white and BIOS also available for ambient mode
- Modular optical chamber easily accessible with lens tool
- Low profile design, housing only 4" deep
- Compatible with common pillow speaker controls



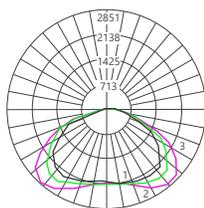
Reading Light Option



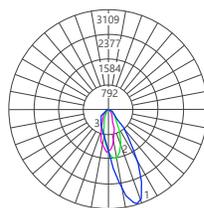
BCMF22



AMBIENT



EXAM



READING



BCMF24



Patent Pending



## Multi-Function Asymmetric Overbed

The recessed multi-function 6" x 48" asymmetric luminaires mount on either side of the bed, which leaves the center ceiling clear for lift rails and other essential equipment. The BeWell™ Optics transition between ambient and exam functions seamlessly for the most comfortable, shadow-free illumination.

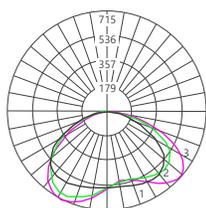
- BeWell™ Optics uses light guide technology for superior quality of light
- Three functional modes: ambient, exam, and reading
- Reading light option: 3000K – 4000K
- Ambient and exam CCTs: 3000K – 4000K. Tunable white available
- Mounts offset from bed to eliminate shadows & clear center ceiling
- Low profile design, housing only 3 3/4" deep
- Compatible with common pillow speaker controls
- Sealed, seamless construction provides smooth surface for cleanability
- Sold in pairs. Single luminaire 6" x 48" available



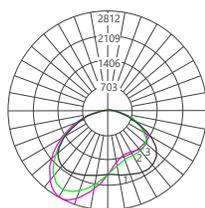
Single BCASY1 throws light asymmetrically into room



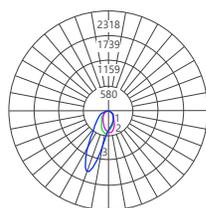
Reading light option



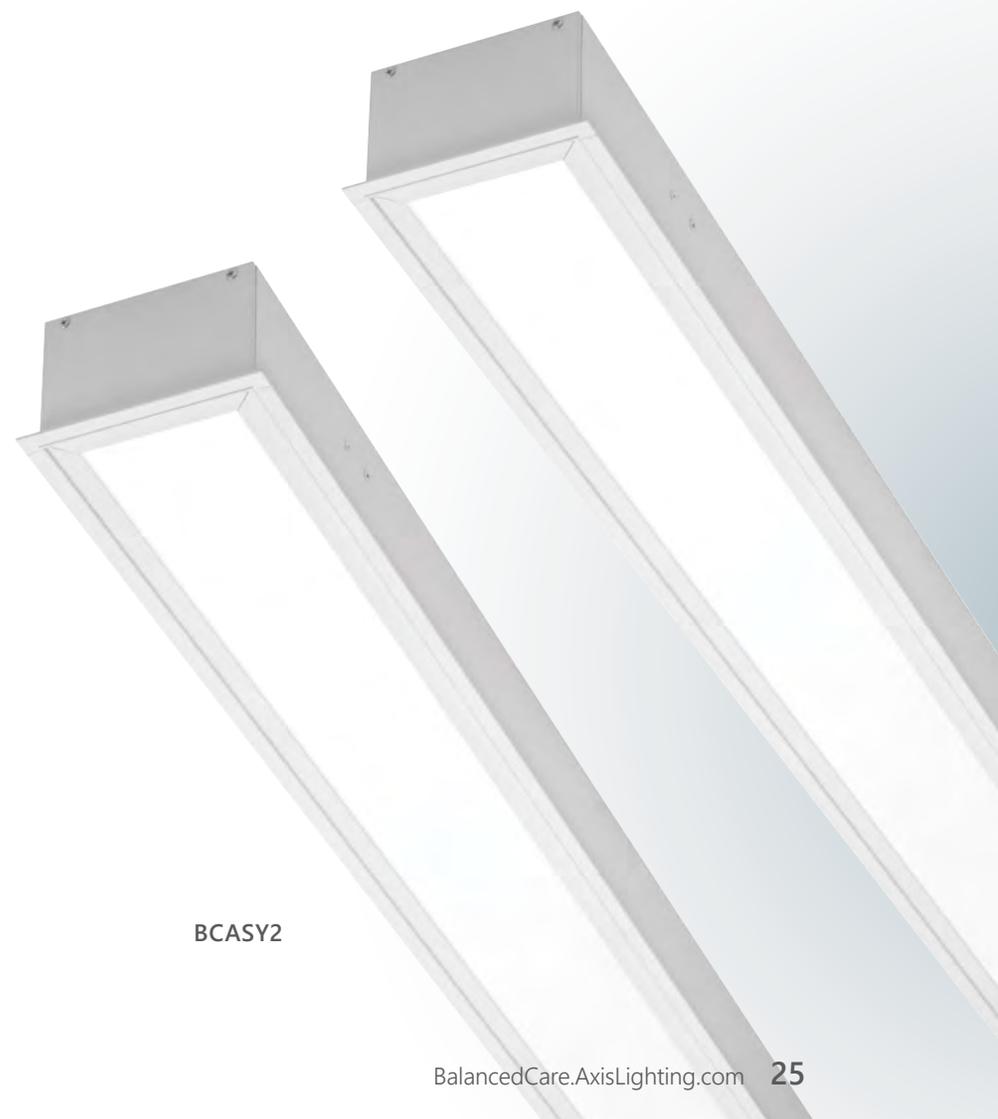
AMBIENT



EXAM



READING



BCASY2



Patent Pending



## Sconces

Architectural sconces complement ambient lighting in the corridor, and often provide low-level lighting when daytime transitions to evening. BalancedCare Lighting offers three decorative designs in multiple sizes for scalability, with integral nightlight option to aid navigation. Additionally, each luminaire is low profile to meet ADA requirements, and features BeSealed Construction for cleanability.

- Designed with comfortable BeWell Optics providing ambient lighting and wall glow
- Amber nightlight option to aid navigation
- Detachable backplate for quick-disconnect and room-side access to driver
- Horizontal or vertical orientation, surface mounting in multiple lengths and widths
- Shallow depth (Open Book - 1 7/8", Box - 2", Closed Book - 2 5/8")
- BIOS and tunable white available in select sizes



**BOX**  
BCSB



**CLOSED BOOK**  
BCSC



Low profile (less than 3")  
ADA compliant



**OPEN BOOK**  
BCSO

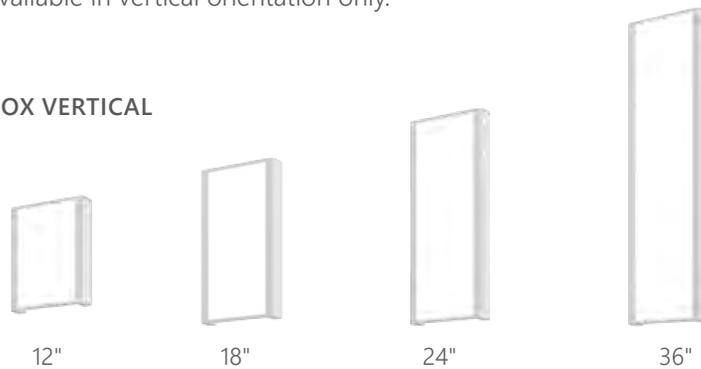


Patent Pending



All BalancedCare sconces are available in 4 lengths - 12", 18", 24" and 36" in both vertical and horizontal orientations. Nightlight available in vertical orientation only.

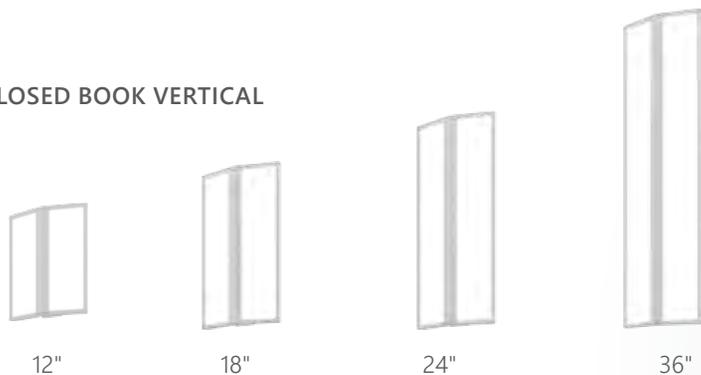
**BOX VERTICAL**



**BOX HORIZONTAL EXAMPLE**



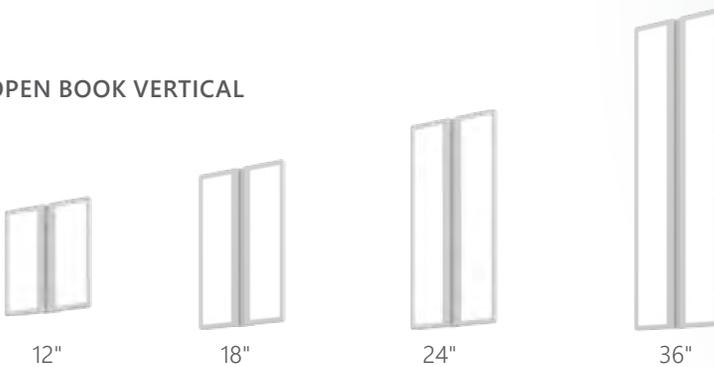
**CLOSED BOOK VERTICAL**



**CLOSED BOOK HORIZONTAL EXAMPLE**



**OPEN BOOK VERTICAL**



**OPEN BOOK HORIZONTAL EXAMPLE**

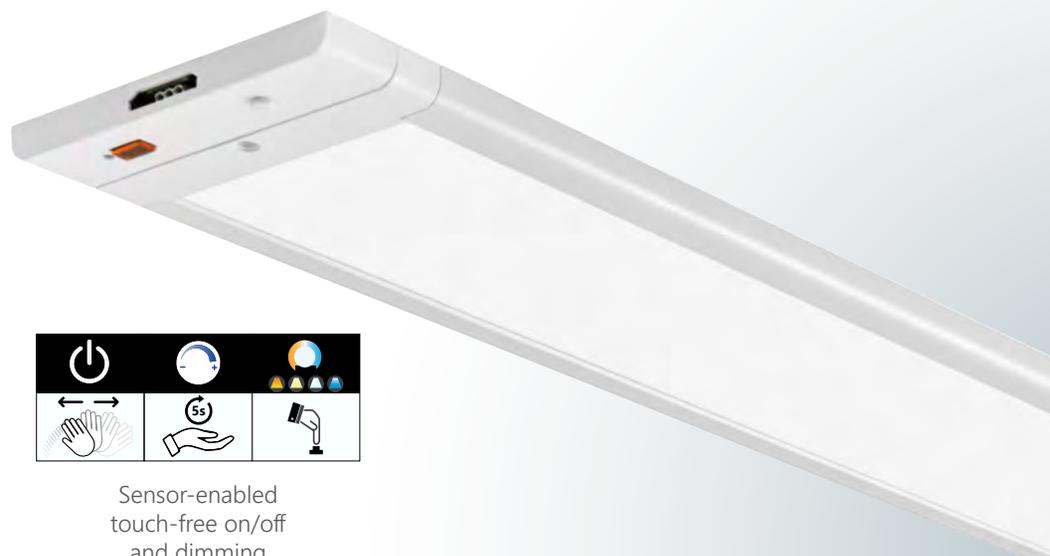




## Undercabinet

The BalancedCare™ undercabinet series features state-of-the-art hand motion technology to enable touch-free dimming, which supports infection control standards. This wafer thin design with BeWell lightguide technology features sharp cutoff distribution and enables user selection of white LED color temperatures from 2700K-4000K.

- Wafer-thin - less than 0.5" profile in 6 lengths: 10", 16", 23", 30", 36", and 42"
- Four-position selectable CCT or static CCT
- Available CCTs: 2700K, 3000K, 3500K, 4000K
- Touch-free dimming for infection control
- Available with interconnect and power cordset accessories



Wafer thin - less than 0.5" profile



Linking connectors in 6", 12", and 24" lengths



Power cordset



Sensor-enabled touch-free on/off and dimming



Joiner link for continuous runs



**UNDERCABINET**  
BCUC



Patent Pending



## Steplights

BalancedCare™ Steplights provide safe navigation through the patient room, bathroom, corridors and other common areas. Durable in design, they are available in multiple styles and optional white (2700-4000K), amber or blue LED.

- Rectangular and oval faceplates, horizontal and vertical mounting
- Steplights mount to a standard junction box
- 90° cutoff obstructs light trespass
- Multiple LED choices: White 2700 - 4000K, Amber or Blue
- Activation by photocell sensor
- Pre-set light level can be adjusted up or down during installation
- Semi-recessed; faceplates extend only 5/8" off wall
- Soft contoured design prevents dust collection and is easy to clean



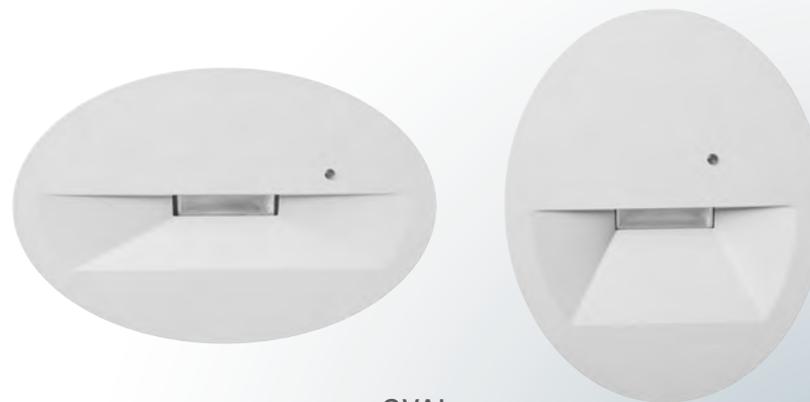
Thru wall option



White LED:  
2700-4000K

Amber LED

Blue LED



**OVAL**  
BCSOH / BCSOV



**RECTANGULAR**  
BCSRH / BCSRV



Patent Pending

## Multi-Function Overbed



**MULTI-FUNCTION OVERBED**  
 BCM22 (2'x2') BCM24 (2'x4')

## Multi-Function Asymmetric Duo



**MULTI-FUNCTION ASYMMETRIC DUO**  
 BCASY2



## Sconces



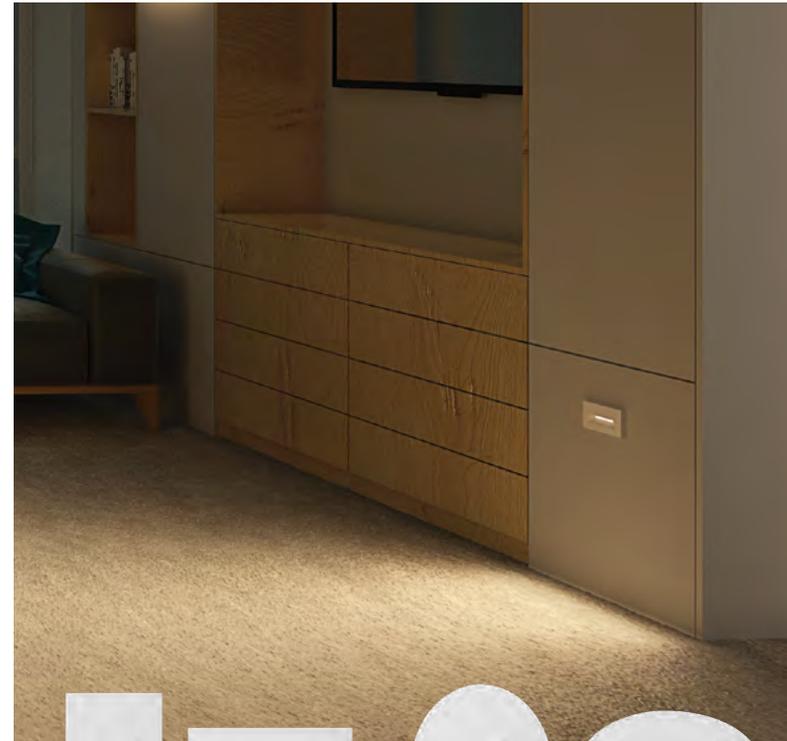
**BOX**  
BCSB

**CLOSED BOOK**  
BCSC

**OPEN BOOK**  
BCSO



## Steplights



**RECTANGULAR**  
BCSRH / BCSRV

**OVAL**  
BCSOH / BCSOV



## Patient Room

Since patient room lighting is multi-functional due to the various tasks performed in these spaces, proper control of these functions is critical. BalancedCare luminaires with BeWell Controls will ensure seamless integration between the lighting, control devices and users. Luminaires can also be sensor-ready to enable behaviors that not only enhance patient and staff experience, but serve to improve hospital efficiency as well. For additional information on Axis' overall controls platform and tunable white options, please refer to our BeWell Controls on page 14.





REGO TABLET\*



PILLOW SPEAKER\*



LOW VOLTAGE CONTROLLER\*\*

From patient-controlled pillow speakers that communicate with nurse call systems, to wall switches controlled by the care providers, Axis has partnered with trusted industry leaders to tie the patient room into the overall healthcare operating system.

WALL SWITCH OPTIONS:



BCWS1



BCWS2



BCWS3



BCWS4



BCWS5



BCWS6

\*Supplied by Curbell

\*\*Integral to recessed luminaires

## Listings and Technologies

- 
**ADA Compliant** — objects projecting from walls (e.g., sconces) shall protrude no more than 4" into walks, halls, corridors, passageways or aisles
  
- 
**CCEA Approved** — The City of Chicago Environmental Air (CCEA) rating ensures that the luminaire is inherently airtight. Wiring and/or branch circuit terminations are sealed off and gasketed from the plenum air space. This listing ensures that the luminaire is sealed to limit air flow from the room side to the plenum.
  
- 
**Damp** — Denotes that the luminaire is UL Listed for Damp Locations. A damp location is normally or periodically subject to condensation of moisture in, on, or adjacent to the electrical components of a luminaire.
  
- 
**IK10** — an IK rating indicates the capacity of an enclosure to protect its contents from external impacts in accordance with IEC 62262:2002 and IEC 60068-2-75:1997. The IK10 rating is the maximum on the scale from IK00 (no protection) and proves protection against 20 joules of impact (the equivalent to the impact of a 5kg mass dropped from 400mm above the impacted surface)
  
- 
**IC** — Insulated Ceiling (IC) recessed lights are rated for direct contact with insulated ceilings or, that is, they can be installed in contact with combustible material or blanketed with thermal insulation.
  
- 
**IP64** — UL Certified IP64 per IEC 60598 ensures that the enclosure is dust-tight and protected against splashing water without any harmful effects.
  
- 
**NSF2** — denotes that the luminaire has been evaluated for corrosion resistance, cleanability and the ability of exposed material to withstand normal wear. This supports the infection control standards established by healthcare.
  
- 
**UL/CUL Listed** — All BalancedCare luminaires have been tested to be in compliance with Underwriter's Laboratory (UL) performance standards. UL is a world leader in product safety testing and certification.



**BeWell™ Optics** — BeWell is a patent-pending, materials-based lightguide technology that uses molecular optics to direct light. These highly efficient optics are multi-functional, available in direct, indirect, asymmetric or a combination to deliver high performance, comfortable illumination.



**BeSealed™ Construction** — Design attributes that enable easier maintenance, less costly construction, updated lighting technology, and engineered features that support today's stringent infection control standards.



**BeWell™ Technologies** — BeWell Technologies encompasses BalancedCare controls (which includes patient controls, wireless and POE), Axitune tunable white and color tuning systems, and BIOS SkyBlue.



**BeWell™ Controls** — BeWell Controls takes a systems approach to ensure seamless integration between the luminaires, sensors, control devices and users. It includes all elements of a facility's controls system, supporting Axis' agnostic approach to provide comprehensive systems support.



**POE** — Power over Ethernet (POE) delivers both lighting power and data transfer on one low-voltage wire, and enables communication with multiple building systems using Ethernet protocol, along with many types of sensors. All BalancedCare luminaires are UL Listed 2108 for POE compatibility.



**Axitune Tunable White** — Tunable white technology enables the user to independently control both color temperature and intensity of light within a given application. This provides the ability to change the color of light from warm to neutral to cool in appearance, over time, based on the needs of the occupant or the space. See page 16 for additional information.



**BIOS®** — Axis Lighting is a proud partner with BIOS Lighting. Its SkyBlue® technology creates environments that improve alertness and promote better sleep, health and well-being. BIOS is available in BalancedCare overbed luminaires.

## Ratings Explained

EXAMPLE  
**IP64**

**DEGREES OF PROTECTION INDICATED BY THE FIRST CHARACTERISTIC NUMERAL**

Numeral	Short Description	Brief details of objects which will be "excluded" from the enclosure
0	Non-protected	No special protection
1	Protected against solid objects greater than 50 mm	A large surface of the body, such as a hand (but no protection against deliberate access). Solid objects exceeding 50 mm in diameter.
2	Protected against solid objects greater than 12 mm	Fingers or similar objects not exceeding 80 mm in diameter. Solid objects exceeding 12 mm in diameter.
3	Protected against solid objects greater than 2.5 mm	Tools, wires, etc., of diameter or thickness greater than 2.5 mm Solid objects exceeding 2.5 mm in diameter.
4	Protected against solid objects greater than 1.0 mm	Wires or strips of thickness greater than 1.0 mm. Solid objects exceeding 1.0 mm in diameter.
5	Dust-protected	Ingress of dust is not totally prevented but dust does not enter in sufficient quantity to interfere with satisfactory operation of the equipment.
<b>6</b>	<b>Dust-tight</b>	<b>No ingress of dust</b>

EXAMPLE  
**IP64**

**DEGREES OF PROTECTION INDICATED BY THE SECOND CHARACTERISTIC NUMERAL**

Numeral	Short Description	Brief details of objects which will be "excluded" from the enclosure
0	Non-protected	No special protection
1	Protected against dripping water	Dripping water (vertically falling drops) shall have no harmful effect.
2	Protected against dripping water	Vertically dripping water shall have no harmful effect when the enclosure is tilted at any angle up to 15° from its normal position.
3	Protected against spraying water	Water falling as a spray at an angle up to 60° from the vertical shall have no harmful effect.
<b>4</b>	<b>Protected against splashing water</b>	<b>Water splashed against the enclosure from any direction shall have no harmful effect.</b>
5	Protected against water jets	Water projected by a nozzle against the enclosure from any direction shall have no harmful effects.
6	Protected against heavy seas	Water from heavy seas or water projected in powerful jets shall not enter the enclosure in harmful quantities.
7	Protected against the effects of immersion	Ingress of water in a harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time.
8	Protected against submersion	The equipment is suitable for continuous submersion in water under conditions which shall be specified by the manufacturer.



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SOLUTIONS DESIGNED TO SIMPLIFY CIRCADIAN LIGHTING IN EVERYDAY APPLICATIONS



**BIOS SkyBlue® for Healthcare**

Life is all about contrast, perhaps none as important as light and dark, day and night.

As humans, we have evolved with blue sky and daylight as natural cues to keep our body clocks aligned with the 24-hour day. This healthy contrast between daylight and darkness allows our circadian rhythms to function as designed.

Even though this natural lighting cycle is healthy, hospital lighting typically feels anything but natural. BIOS SkyBlue® uses technology to bridge the gap, stimulating circadian response while maintaining the appearance of white light in familiar correlated color temperatures (CCTs).

WHAT YOU DON'T SEE CAN HELP YOU

Benefits of Natural Light without Compromised Light Quality



To the naked eye, the white light produced by a BalancedCare™ luminaire with SkyBlue option may appear identical to the white light from traditional LEDs, but the actual spectrum is different – it delivers greater melanopic content, which contributes to higher melanopic to photopic (m/p) ratios, higher equivalent melanopic lux (EML) and circadian stimulus (CS) – current circadian lighting metrics.

A broad range of Axis luminaires seamlessly integrate SkyBlue technology to enable creation of environments that improve alertness and promote better sleep, health and well-being. For additional Axis lighting featuring BIOS SkyBlue technology, please visit [www.axislighting.com](http://www.axislighting.com)



**BCFA**  
BalancedCare Flexible Ambient



**BCSB/BCSC/BCSO**  
Sconces

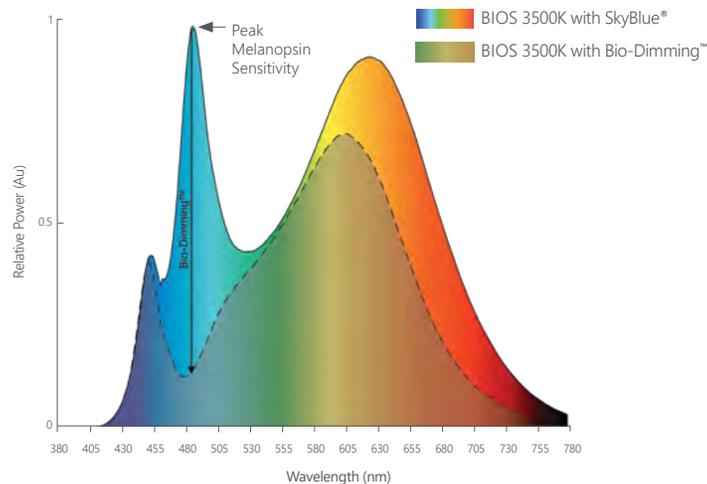


**BCMF\***  
BalancedCare Multi-Function Overbed

**BIOS DYNAMIC SOLUTION FOR 24-HOUR FACILITIES**  
 Better sleep by night, improved alertness by day



**BIOS 3500K Dynamic Engine Spectral Power Distribution**



**Dimmer Settings With Bio-Dimming™ \***

	DIMMER SETTINGS*	BIOS SKYBLUE'	LIGHT OUTPUT		
█	100% (FULL ON)	100%	100%	BIO-DIMMING™	BIOS SkyBlue maintained for maximum circadian Impact. Light output remains relatively constant.
█	99%-51%	100%-0%	100%-90%		
█	50%	NO BIOS	90%	INTENSITY DIMMING	BIOS SkyBlue removed to provide minimal circadian impact. Light output dims down linearly.
█	49%-0%	NO BIOS	LINEAR DIMMING		

\* Also compatible with push button dimmers

BIOS dynamic light engines use easy-to-program Bio-Dimming™ to provide full SkyBlue® content during the day and allow SkyBlue® to be removed in the evening while light levels remain constant. Once SkyBlue is reduced then light levels can be changed.

**Functional white light with healthy impact**

- Maintains appearance of white light while invisibly delivering a spectrum with greater melanopic content
- Peaks at 490 nanometers (nm) to target melanopsin, the light-sensitive protein contained in our non-visual photoreceptors

**Static solution supports proper daytime circadian stimulus**

- The static spectrum delivers a steady but invisible blue-light boost to white light throughout the day, in choice of 3000K, 3500K or 4000K

**Dynamic solution for 24-hour facilities**

- Supports daytime circadian stimulus, reduces nighttime stimulus
- Skin color in its true light
- CRI > 80; R9 > 75 at each correlated color temperature, because color rendering is so important in healthcare

**The controls you know**

- Uses any single channel LED driver with 0-10V dimming interface

## CIRCADIAN LIGHTING METRICS

Circadian Stimulus (CS), Equivalent Melanopic Lux (EML), and Melanopic Equivalent Daylight Illuminance (MEDI)



Metrics have been developed as tools to enable lighting professionals to create environments that promote alertness by day and good sleep at night – prime examples of circadian rhythms, or biological processes that repeat every 24 hours.

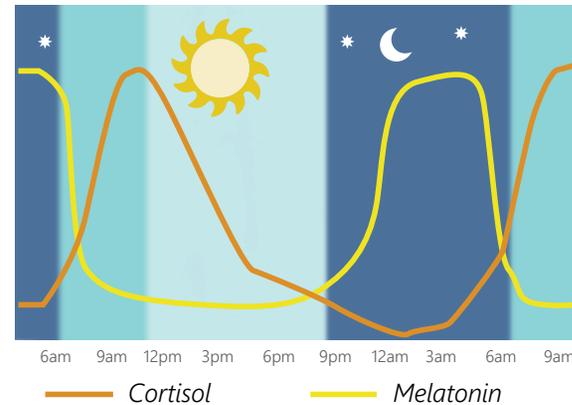
This becomes especially important in hospitals where schedules are erratic, where support of circadian health can also improve overall health and wellbeing.

Key elements to entrain – or synchronize – humans’ biological clocks to the light/dark cycles of the 24-hour day are amount, spectrum, length of exposure, time of day, distribution, and personal light history – one’s sensitivity to light.

Research has shown that these elements, when delivered in the right combination, can improve sleep quality, reduce agitation, depression, and fatigue for patients, caregiving staff, and families in hospital environments. These positive effects can last beyond a patient’s discharge or after a night shift nurse leaves to go home.

Delivering the right light at the right time of day helps avoid circadian disruption, which can cause poor sleep but also increase risk of serious illnesses such as cancer, heart disease and delirium.

Recently discovered photoreceptors in the human eye – photosensitive retinal ganglion cells or ipRGCs– contain the protein melanopsin, which is highly sensitive to 460–480 nm blue wavelengths. When stimulated by light, ipRGCs send a signal to the body’s master clock, telling it to reset its cycle for the next 24 hours. That signal triggers a variety of biological processes, including essential production of hormones such as melatonin and cortisol.



Importance of light/dark signal:

Cortisol rises with the early light of day, keeping us awake and alert. Melatonin is suppressed by light during the day, but rises as darkness sets in to promote sleep.



### ALL CIRCADIAN METRIC CALCULATIONS REQUIRE

Spectral power distribution (SPD) of light sources; correlated color temperature (CCT) is not an accurate measure

Light measured on the **vertical plane at eye level**, either 4'-0" Above Finished Floor (AFF) or 18" above the workplane, for adjustable height desks

CS characterizes the human response to light in terms of melatonin. EML and MEDI characterize a light source's effectiveness at stimulating melanopsin. The three are not interchangeable, and each tells a different story – but any of them will indicate if one is on the right path to effective circadian lighting design, depending on the application.

Each metric provides its own calculation tool and counts toward achieving points in the **WELL Building Standard**, v1 or v2, in the **Circadian Lighting Design** category.

## CS

- Factors in contribution of all five photoreceptors, along with amount and spectrum to assess circadian stimulation
- It estimates the percentage of melatonin a person will suppress after one-hour exposure to a light source during the day, which in turn affects that person's melatonin levels at night
- Robust melatonin levels may result in better sleep, improved mood, performance, and feelings of alertness
- High CS of >0.3 recommended for early morning, reducing to <0.1 in the evening
- <https://www.lrc.rpi.edu/cscalculator/>

## EML

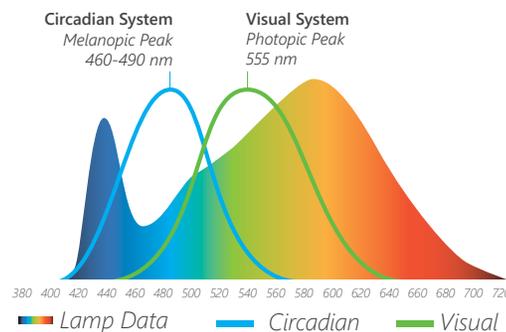
- Introduces the unit 'melanopic lux' as a measure of light's effect on stimulating the circadian system compared to the visual system
- It is a two-part calculation involving the melanopic to photopic (M/P) ratio and illuminance at the eye (Ev)
- The M/P ratio formula converts visual response to circadian response based on the SPD of one (or more) light sources
- It will indicate whether light source A is better or worse than light source B, of equal energy, at stimulating melanopsin
- **$EML = M/P \text{ ratio} \times Ev \text{ (vertical illuminance)}$**
- <https://standard.wellcertified.com/tables> > Table L1: Melanopic Ratio > IWBI link to spreadsheet

## MEDI

- Factors in contribution of all five photoreceptors to determine how the ipRGCs respond to light compared to rods and cones
- Like EML, it is a two-part calculation requiring the melanopic daylight efficacy ratio (m-DER) and illuminance at the eye (Ev)
- M-DER compares a light source's ability to stimulate melanopsin to that of standard daylight
- **$MEDI = m-DER \times Ev \text{ (vertical illuminance)}$**
- [https://balancedcare.axislighting.com/wp-content/uploads/2020/11/CIE-S-026-alpha-opic-Toolbox\\_Nov2020.xlsx](https://balancedcare.axislighting.com/wp-content/uploads/2020/11/CIE-S-026-alpha-opic-Toolbox_Nov2020.xlsx)



Image by Lighting Research Center



# Unified Glare Rating (UGR)

## WHAT IS UGR?

Glare is in the eye of the beholder! UGR measures its impact on visual comfort while helping to achieve WELL points.



The Unified Glare Rating (UGR) is a metric used to predict *discomfort glare* in interior applications and considers the direct light component. It has gained renewed interest of late to achieve points toward WELL certification. Well v2 of the WELL Building

Standard, under the L04 Electric Light Glare Control category, allots points for achieving a UGR of 16 or lower as a luminaire consideration, or as a space consideration, for regularly occupied spaces. As a glare evaluation method, UGR has been defined in CIE documents: CIE 117-1995, CIE 190-2010, CIE 232-2019.

**UGR is not meant to be an attribute of the luminaire alone – but should be based on an application.**

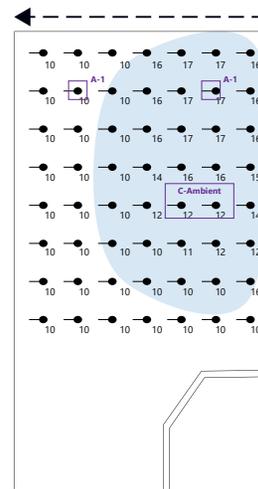


It indicates the contrast, or ratio, between luminaire luminance (perceived as brightness) to background luminance from a reference vantage point, i.e., a patient sitting up in bed, looking straight ahead, with a multi-function luminaire above their head and recessed general ambient luminaires in the adjacent guest area.

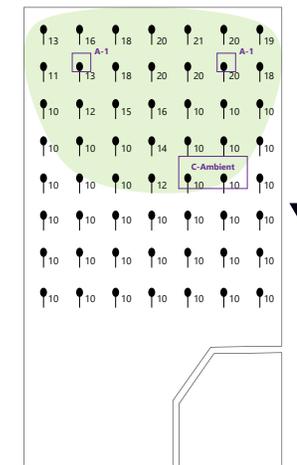
**Line of sight is important** – the relationship of viewers to luminaires will result in multiple UGR values, as shown in the application example below, where:

Luminaires	UGR (Average) at 3.5' AFF	Observer Position
A-1-1000 lm+C-Ambient-7000 lm (shown below)	11.95	Patient Viewpoint from right to left across room, in example below
	11.77	Guest Viewpoint from top to bottom towards bed, in example below
A-1-1000 lm+C-Exam-14,280 lm	11.02	Patient Viewpoint
	13.39	Guest Viewpoint

Type A-1 is the BalancedCare Flexible Ambient 1x1 (BCFA) and Type C is the BalancedCare Multi-Function 2x4 (BCMF24).



**Figure 1:** calculation results in UGR of 11.95 from patient viewpoint (Ambient mode shown).



**Figure 2:** calculation results in UGR of 11.77 from guest viewpoint (Ambient mode shown).

**HOW IS IT CALCULATED?**

Software programs such as AGi32 and Dialux can calculate UGR values – average, max and min – based on this formula

**UGR = 8 log [0.25/Lb \* Σ Ls2\*ω/p2]** that factors in:

- background luminance (cd/m<sup>2</sup>)
- luminance of the apertures of each luminaire in the direction of the observer's eye (cd/m<sup>2</sup>)
- solid angle of the luminous parts of each luminaire at the observer's eye (sr)
- displacement of luminaire from line of sight

**WHAT DO THE NUMBERS MEAN?**

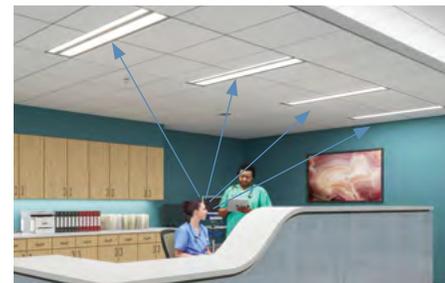
Values are given in the range of 10-30, lower is better; 16 is considered perceptible, 19 just acceptable; above 19 it becomes more uncomfortable. The table below compares UGR values with corresponding 7-step discomfort glare criteria (developed by R.G. Hopkins).

While these numbers are an indication, it is important to remember that interpretations of glare are subjective, as each person's perception differs.

UGR	Discomfort Glare Criterion
10	Imperceptible
13	Just perceptible
16	Perceptible
19	Just acceptable
22	Unacceptable
25	Just uncomfortable
28	Uncomfortable

**Factors Contributing To High UGR, In General:**

- Lumen package – increased lumens could mean higher UGR
- Larger room sizes – more sources in field of view
- Lower ceiling heights, which indicate lower mounting heights
- Luminaire distributions with high angle brightness
- Lower surface reflectances
- Luminaire aperture size
- Spacing – farther apart could mean higher UGR
- Relationship of luminaire (max candela angle) to observer's line of sight



*UGR considers reflectances of surrounding room surfaces, and luminaires within a person's line of sight that may cause them to sense glare*

**Single luminaire values are possible, but they do not tell the whole story**

Although it is misleading to assign a UGR value to a single luminaire, for those seeking that number Photometric Toolbox calculates for uniform arrays of luminaires, based on a single IES file. It sorts results into a table of 190 individual calculations based on an assortment of 19 common room shapes and five combinations of surface reflectances for two observer positions.

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