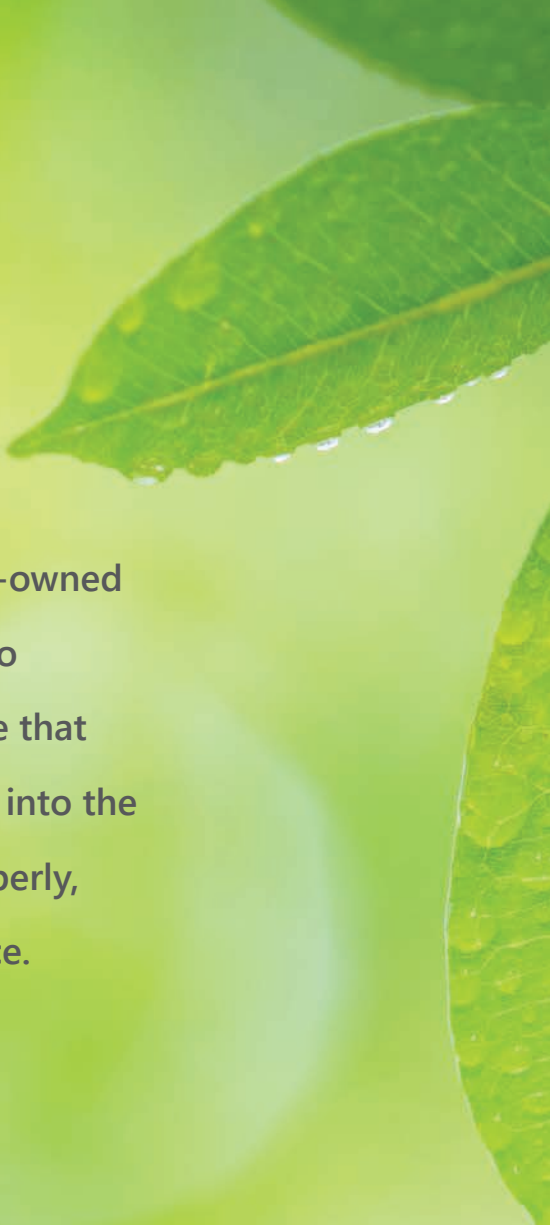




BalancedCare™
by axis

CORRIDORS



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™ CORRIDORS

Hospital corridors are high-volume circulation spaces used by nurses, doctors, patients and visitors alike. Maintaining uniform, glare-free light levels is important for fall prevention measures, wayfinding, and also a consideration for patients wheeled on a gurney or in a wheelchair. Typically, functional asymmetrical lighting is preferred with complementary decorative sconces and steplights to help layer the lighting down the corridor. Luminaires need to be easy to service with access from below, and durable enough to withstand potential impacts within these congested areas.

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

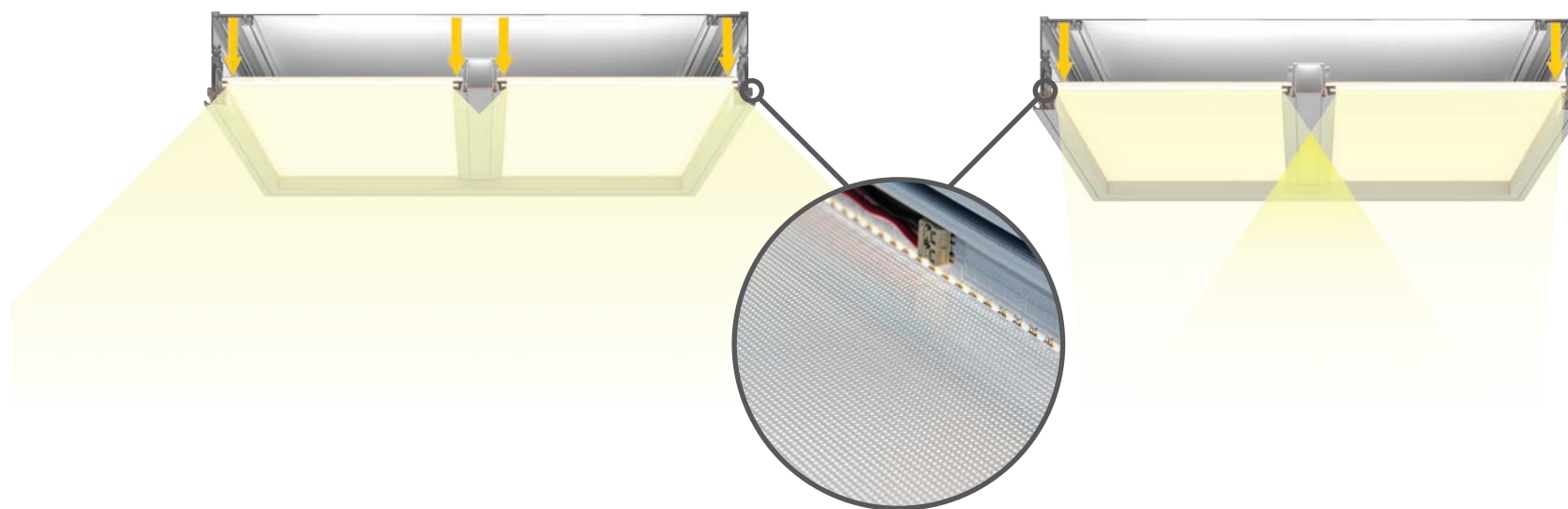
BeWell Optics delivers lighting that promotes a healing environment. BeWell is a patent pending, materials-based technology that uses molecular optics to direct - not reflect - light. The result is amazingly uniform distribution, without glare, shadowing, or pixelation. BeWell provides better visual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

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

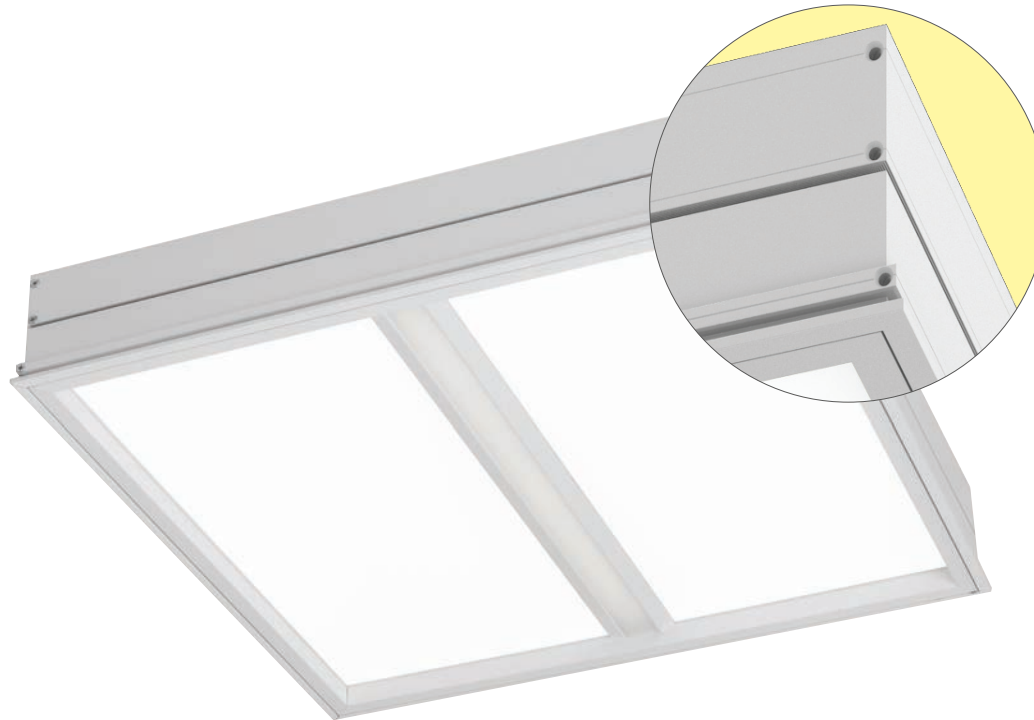
One-piece gasket seals housing to optical cartridge

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



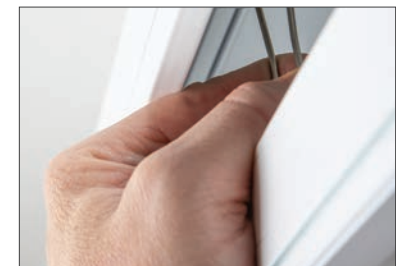
Extruded aluminium housing maximizes LED heat dissipation to ensure cool operation and long life

LENS TOOL

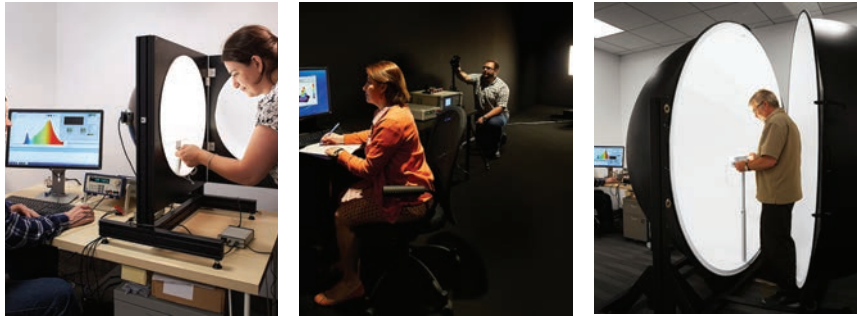


The lens tool seamlessly pulls the doorframe away from the housing and provides easy access to the internal electrical cartridge

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



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	TW2750	80 or 90
2700K to 6500K	TW2765	80 or 90

Corridor Lighting



WELLNESS

A holistic approach to lighting extends to all areas of patient and guest circulation. Lighting that is welcoming, and clearly defines wayfinding, creates a positive, less stressful experience for family and friends when seeking a specific destination within complex hospital environments.



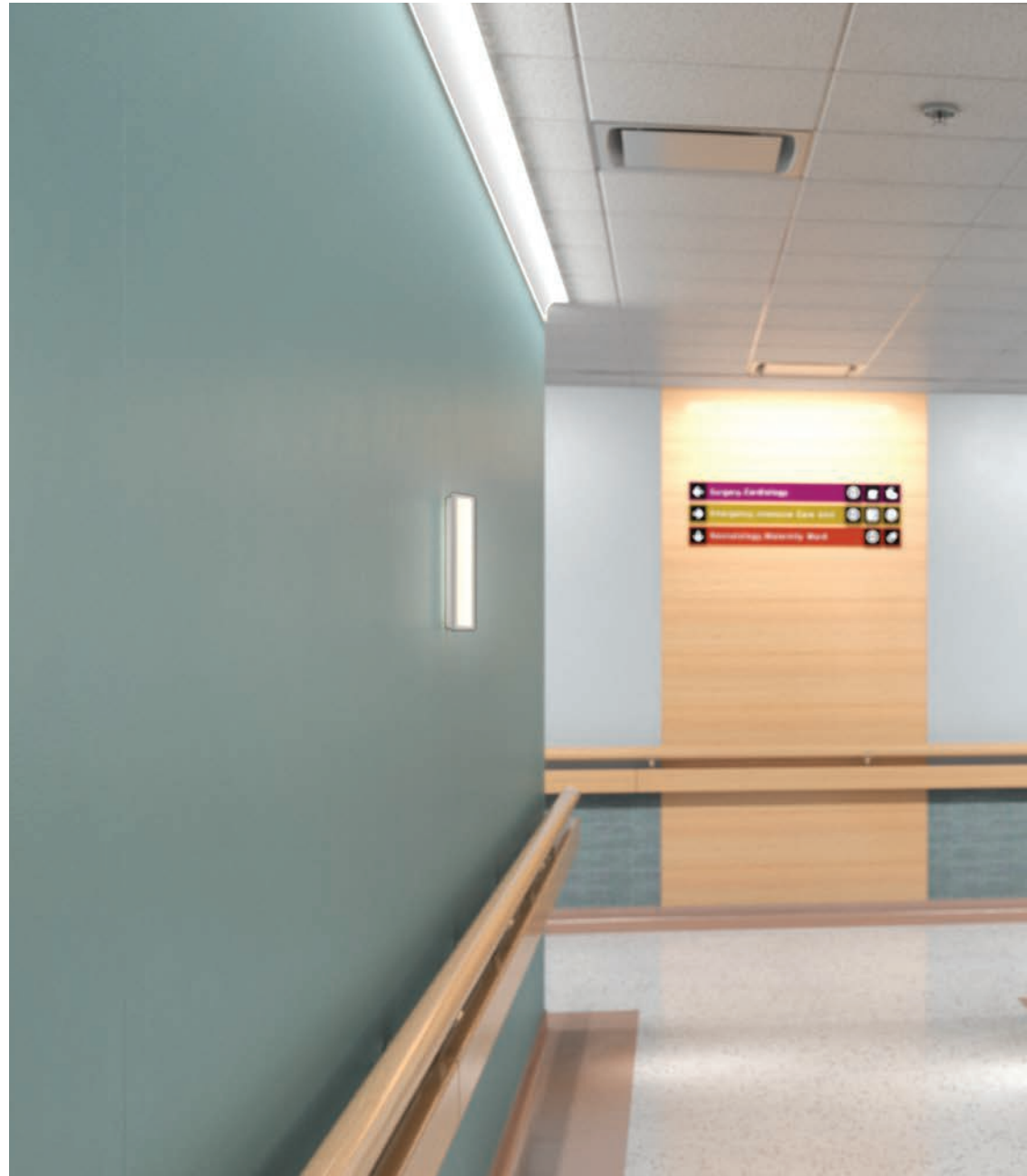
FUNCTIONAL OPTICS & VISUAL COMFORT

Hospital corridors pulse with congestion and activity 24 hours a day. BeWell™ Optics delivers light that can be directed where needed without causing uncomfortable glare for patients viewing it from any angle; or for staff and visitors as they move from one zone to another. Balancing layers of light from multiple low profile luminaires and directions creates a discrete yet effective backdrop to active corridors.



INTELLIGENT CONTROL

BalancedCare luminaires can integrate 24-hour corridor operation into the building's lighting control system, and customize programming to coordinate with adjacent zones. It can also include sensing options to track equipment and staff, and monitor room usage to optimize space utilization. Layered with BeWell™ Optics, they simplify healthcare solutions.





ARCHITECTURAL FORM

Let lighting be your guide. Sleek, linear architectural forms 'follow' the corridor to reinforce the sense of passage and movement. Slim wall sconces complement ambient lighting, provide night lighting, and visually add identity to the diversity of corridors in a complex hospital system.



INFECTION CONTROL & PERFORMANCE

Transfer of bacteria and pathogens do not exclude corridors. Smooth, non-corrosive luminaire surfaces can withstand the harsh cleaning protocols necessary to minimize risk of healthcare associated infections (HAIs). BalancedCare corridor luminaires have been tested and certified with the appropriate listings for these applications, ADA-compliant sconces among them. Look for the performance icons associated with each product.



EASE OF MAINTENANCE

In these high congestion areas, easy-to-clean surfaces and room-side access to drivers and components facilitates maintenance efforts, reduces costs, and prolongs life of luminaire systems. The ability to remove a component cartridge and replace it without disruption to traffic flow and daily activities is especially valued.



Lighting Requirements

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.

GENERAL AMBIENT



Sleek, architecturally integrated perimeter lighting provides glare-free passage from any vantage point, as well as recommended light levels for patient corridors of 100 lux day, 50 lux night, 2:1 avg:min uniformity.

STEPLIGHT



With choices in color of light and faceplate style, these low profile steplights provide a visible rhythm of light for navigation, 90° cutoff to minimize glare, mounted at 18" Above Finished Floor (AFF) to provide low recommended light level of 4 lux.

SCONCES



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 recommended light levels, at floor, of 100 lux day, 50 lux night.

Decentralized Nurses' Station

Complex lighting needs require flexible lighting systems with simple controls and glare-free optics. Nestled between two patient rooms, these nurses' stations allow nurses to give more personal attention to fewer patients at a time. They need clear visibility into the room, without veiling reflections on windows or monitors, personal control over the lighting at their station for visual tasks and circadian regulation, and overriding control in case a patient is in distress.





ELLE

The all new Elle corner mount is made with wall-to-ceiling applications in mind. In a busy circulation area like a corridor, the Elle tucks quietly into the corner where ceiling meets wall, asymmetrically directing comfortable light into the corridor and protecting patients on gurneys and wheelchairs from typical harsh glare. With its patent-pending curved design, Elle evokes organic flow and incorporates BeWell CLS Optics to service a multitude of applications. Its curved design facilitates cleaning and is designed for durability, especially when mounted vertically in high traffic areas.

- Curved illuminated surface enabled by patent-pending BeWell CLS light guide technology
- InstaHinge™ wall-to-ceiling corner mounting mechanism for easy installation and access
- Hairline joiner for continuously illuminated runs
- Integral Axis mini constant current driver, 0-10V dimming standard
- Individual lengths up to 8'

ENDCAP OPTIONS



Step



Flat



InstaHinge™ on track 90° rotating mechanism secures fixture along ceiling line



Patent-pending concave luminaire design results in an unobtrusive clean line down the corridor



ELLE
ELSC



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

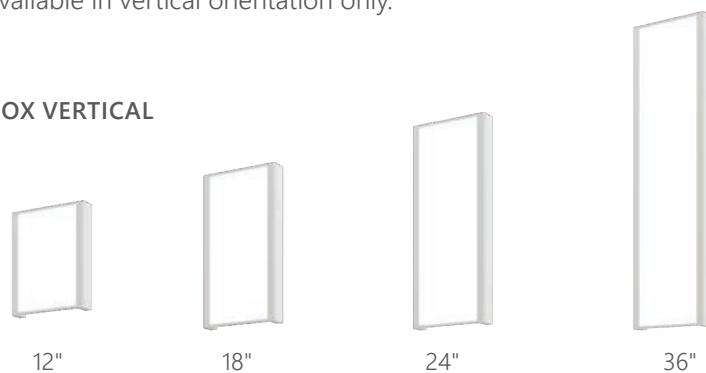


Patent Pending



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.

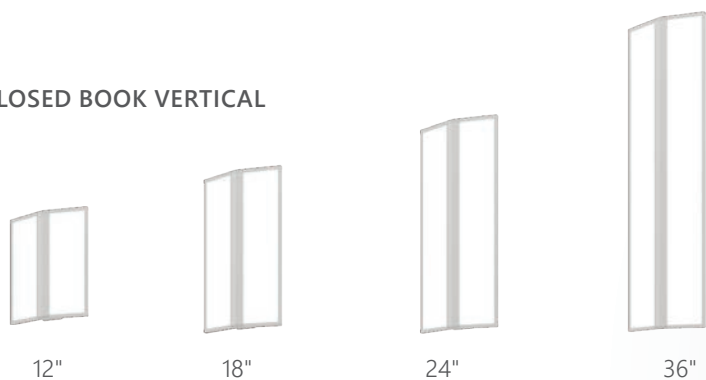
BOX VERTICAL



BOX HORIZONTAL EXAMPLE



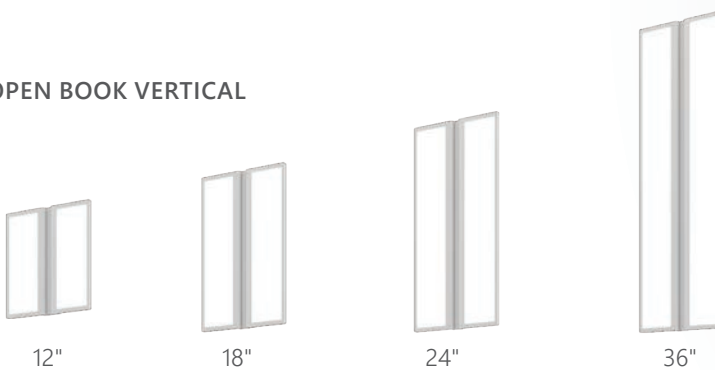
CLOSED BOOK VERTICAL



CLOSED BOOK HORIZONTAL EXAMPLE



OPEN BOOK VERTICAL



OPEN BOOK HORIZONTAL EXAMPLE





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.

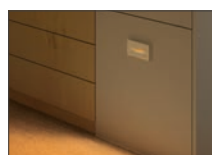
- Rectangular and oval faceplates, horizontal and vertical mounting
- Steplights mount to a standard junction box
- 90° cutoff obstructs light trespass
- Multiple LED choices: White 2700 - 4000K, Amber or Blue
- Activation by photocell sensor
- Pre-set light level can be adjusted up or down during installation
- Semi-recessed; faceplates extend only $\frac{5}{8}$ " 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



ELLE



ELLE
ELSC

ENDCAP OPTIONS



Step



Flat



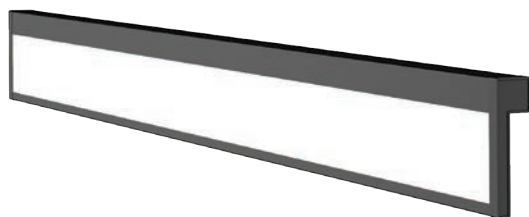
90° Mounting plate
secures fixture along
ceiling line



Concave design results in
an unobtrusive clean line
down the corridor



Pose

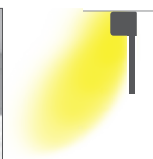


POSE TASK
PSBC

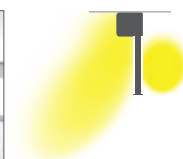
TWO OPTICS + TWO SIDES



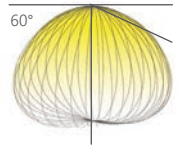
One illuminated side



Two illuminated sides



Beam 3 SurroundLite™



Featuring SurroundLite™ optics, Beam3 delivers sharp cutoff and reduced contrast to improve visual comfort. Additionally, luminaires can be more widely spaced so fewer are needed to light the corridor.

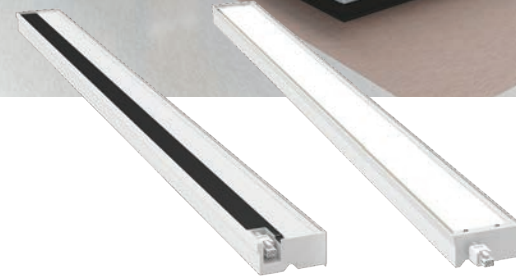


Create clean, seamless runs that are easier to install with this quality press-in acrylic lens that will not crinkle or bow. Available in lengths up to 48'

RECESSED BEAM 3
B3RLED



Cove Perfekt™



COVE CEILING
CC

COVE WALL
CCW



Sconces



BOX
BCSCB



CLOSED BOOK
BCSC



OPEN BOOK
BCSO



Steplights



RECTANGULAR
BCSRV / BCSRH



OVAL
BCSOV / BCSOH



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.



IC — Insulated Contact (IC) rated recessed luminaires can be used in a ceiling that is insulated without running the risk of overheating.



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.
6	Dust-tight	No ingress of dust

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.
4	Protected against splashing water	Water splashed against the enclosure from any direction shall have no harmful effect.
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.



The author thanks the International Electrotechnical Commission (IEC) for permission to reproduce Information from its International Standards. All such extracts are copyright of IEC, Geneva, Switzerland. All rights reserved. Further information on the IEC is available from www.iec.ch. IEC has no responsibility for the placement and context in which the extracts and contents are reproduced by the author, nor is IEC in any way responsible for the other content or accuracy therein.

IEC 60598-1 ed.8.1 "Copyright © 2017 IEC Geneva, Switzerland. www.iec.ch"

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



BCFA

BalancedCare Flexible Ambient Overbed



BCSB/BCSC/BCSO

Sconces



BCMF*

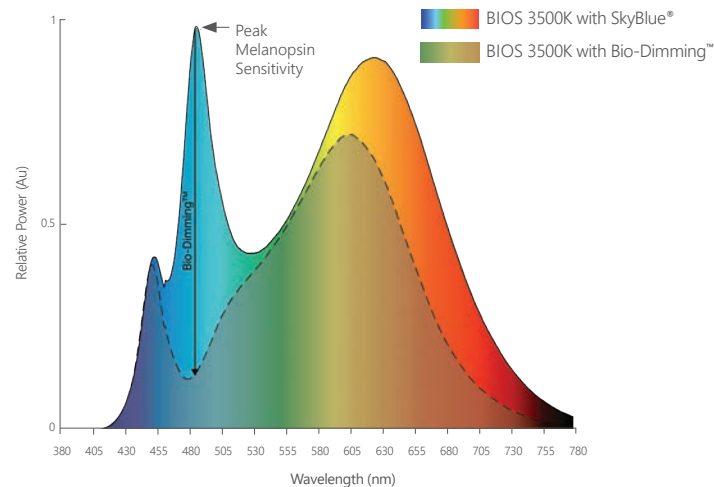
BalancedCare Multi-Function Overbed

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.

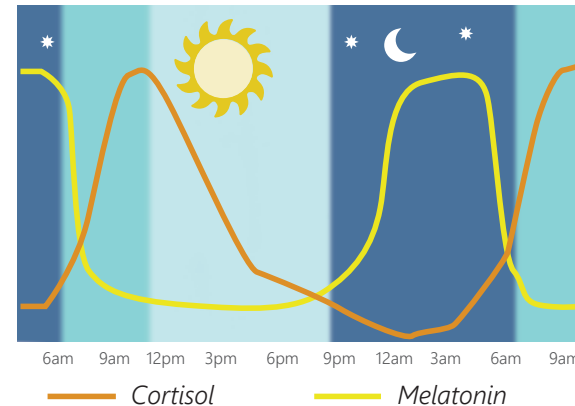
This becomes especially important in hospitals where schedules are erratic, where support of circadian health can also improve overall health and wellbeing.

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.

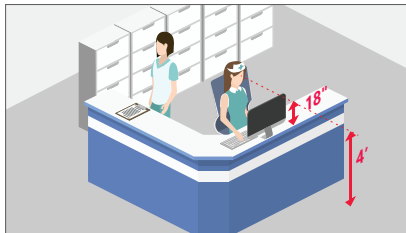
Delivering the right light at the right time of day helps avoid circadian disruption, which can cause poor sleep but also increase risk of serious illnesses such as cancer, heart disease and delirium.

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/>

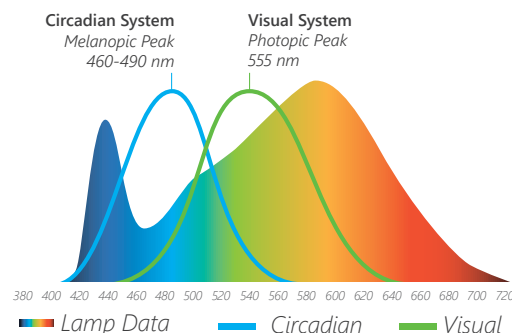


EML

- 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.staging.mxo.website/wp-content/uploads/2020/09/CIE-S-026-alpha-opic-Toolbox.xlsx>



BalancedCare™
by **axis**

2505 Senkus St.
Lasalle, QC H8N 2X8
Canada

Toll Free: 1 800 263-AXIS (2947)

Tel.: 514 948-6272

Fax: 514 948-6271

BalancedCare.AxisLighting.com