

ES-SYSTEM

CIRCADIAN TECHNOLOGY

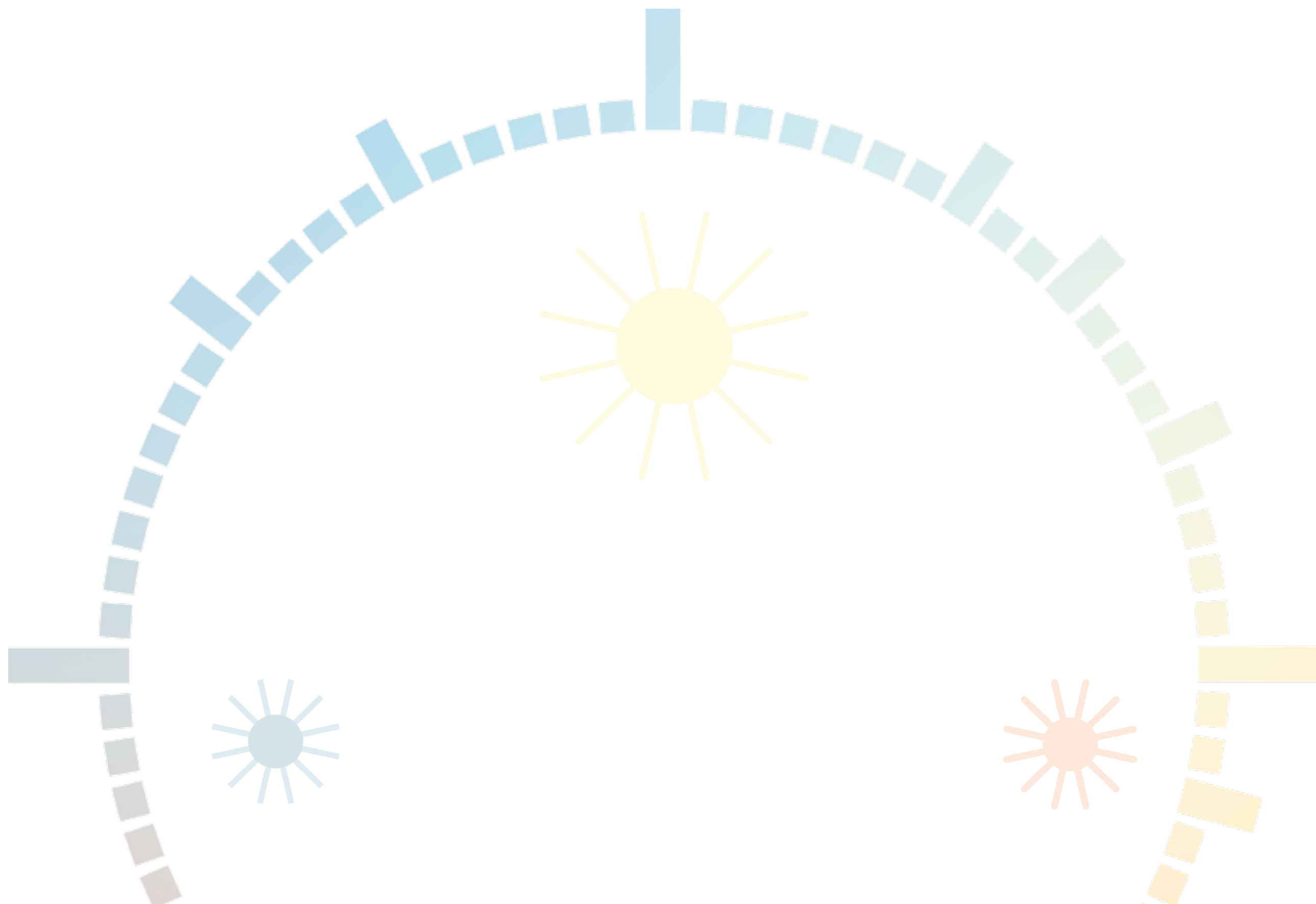
powered by *SunLike*



CIRCADIAN

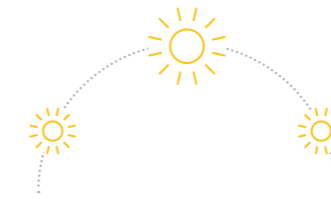
Human Centric Lighting

JUST LIKE DAYLIGHT



"Having talked with ES-SYSTEM about what is technological-ly possible when combining the latest LEDs with spectral power distribution coming as close as possible to sunlight, and photo-receptor-weighted adjustments in intensity based on local sky measurements, ES-SYSTEM's way forward in designing lighting installations being in harmony with human circadian rhythms is the most advanced I have come across so far."

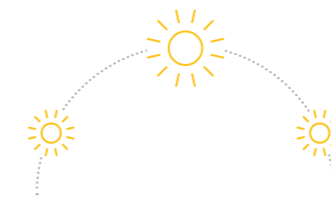
Katharina Wulff, PhD
University Research Lecturer in Chronobiology and Sleep
University of Oxford
United Kingdom



DAYLIGHT - A NATURAL REGULATOR

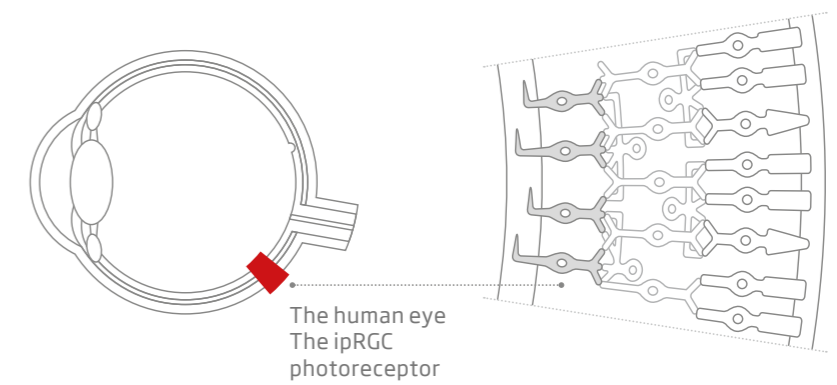
Human activity functions according to a rhythm determined by nature. Until the invention of artificial lighting, it was the sun that decided about people's daily activities by waking them up at sunrise and indicating that it was time to rest at sunset.

Evolution has forced a rhythm upon us that divides the day into two parts. We spend 16 hours being active, and the remaining 8 hours resting. This daily activity pattern is determined not only by practicality. Scientific studies prove that a dependency of a chemical nature also exists. Light not only helps us to discover the images coming from the world that surrounds us. It regulates sleep, participates in the absorption and production of vitamins, and takes care of proper hormonal management. What's important, daylight directly affects people's moods and well-being.



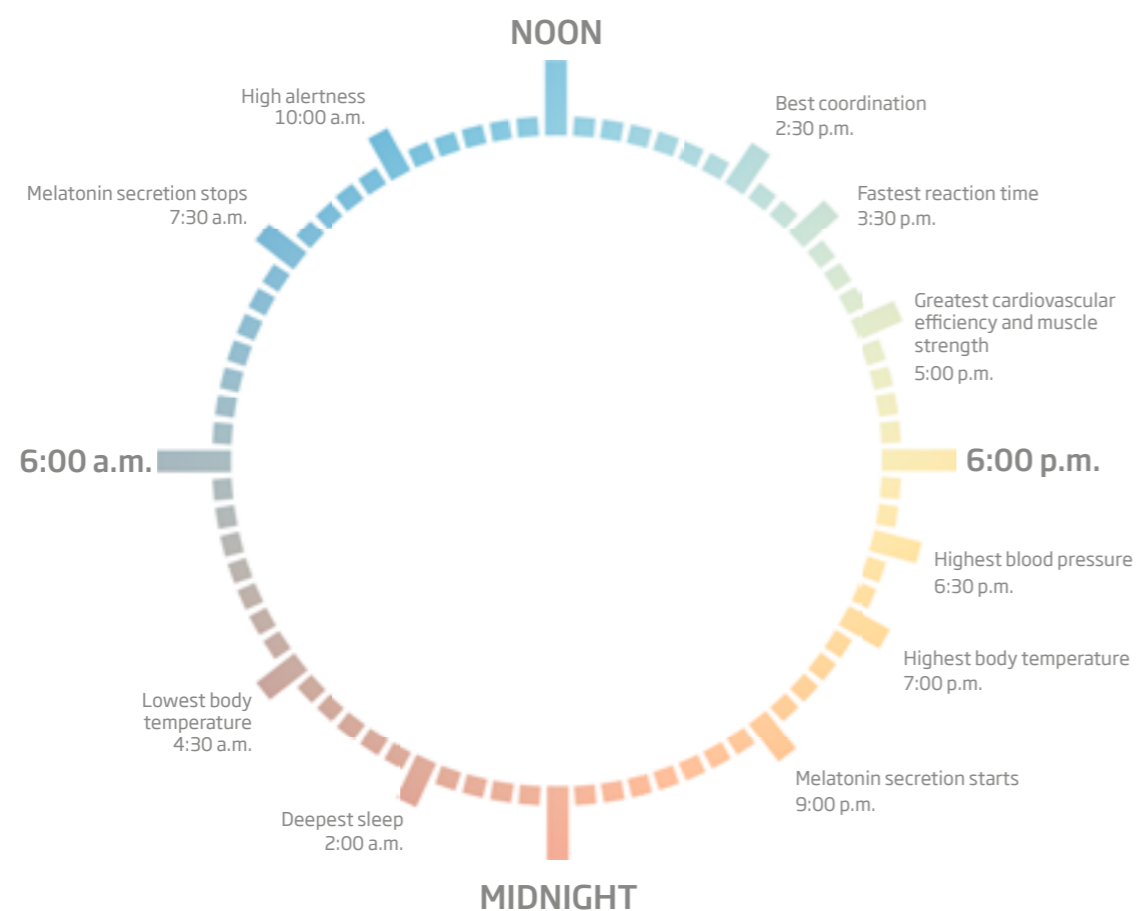
In 2001, it was discovered that the eye has three types of photoreceptors, and not two, as had been previously thought: cones and rods. This discovery revolutionized the perception of the significance of the light spectrum and how it affects humans. As it turned out, this third receptor (the ipRGC photoreceptor) is particularly sensitive to a narrow range of blue light, which is most abundant in natural sunlight in the morning and decreases during the day.

The ipRGC photoreceptor is located in the front of the retina. It is most densely distributed in its lower part, which is due to the angle of the sun's rays, which provide information about the time of day. The photoreceptor transmits this information to the pineal gland, which in turn controls the complicated process of melatonin release.



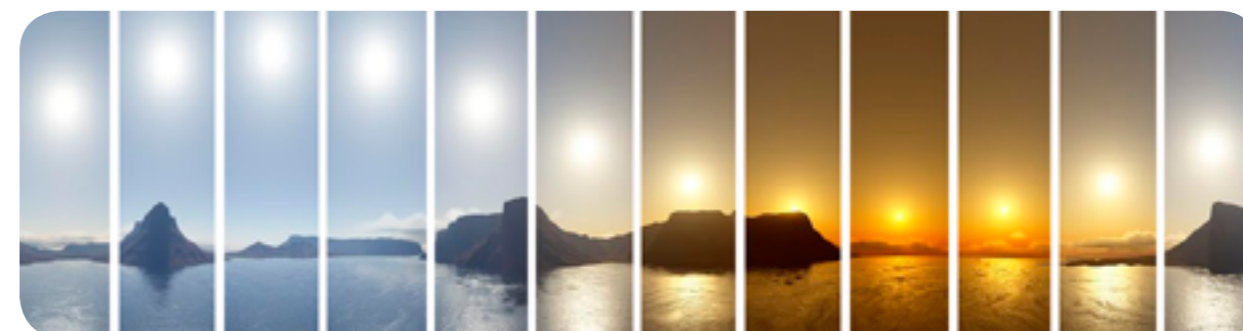
HUMAN CENTRIC LIGHTING

Since the discovery of the dependence between the impact of daylight on humans and the circadian rhythm, the lighting industry is faced with a new task. Today, providing light with a spectrum as close as possible to natural daylight is virtually equally important as ensuring general visual comfort.



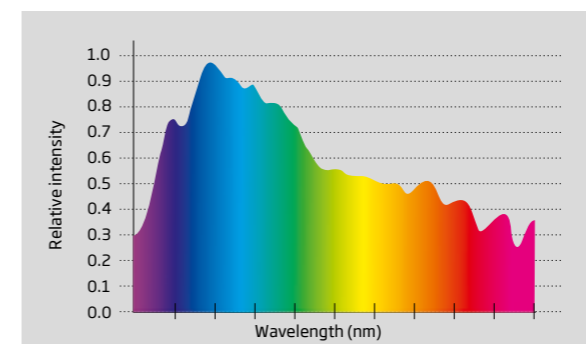
Nowadays more and more people are struggling with sleep disorders, apathy, and even depression. Scientists have unequivocally confirmed that many of these problems are caused by the deregulation of the natural circadian rhythm, which in turn is a consequence of lacking access to daylight. Spending the majority of the day in rooms with limited access to daylight and the seasons with a significantly shorter daytime expose people to the adverse phenomenon of releasing melatonin at the same level throughout the day. This results in numerous negative consequences, such as: lack of concentration, bad mood, drowsiness, fatigue, and seasonal affective disorder. This causes the efficiency of our work and learning to deteriorate drastically.

In order to minimize the effects of a disrupted circadian rhythm, ES-SYSTEM has expanded its product offer to include luminaires equipped with CIRCADIAN technology, one of the most technologically advanced lighting control systems that mimics the spectrum of sunlight. CIRCADIAN is a proprietary solution using the latest generation of SunLike LED modules manufactured by Seoul Semiconductor together with specialized blue LEDs with a specific wavelength. Mixing white light with blue light suppresses the process of melatonin release, activates the human body and prepares it for daytime activities. Thanks to CIRCADIAN, the light that illuminates our workplace stimulates efficiency, creativity and alertness. We are less tired and less prone to fatigue, no longer depending on access to natural daylight.

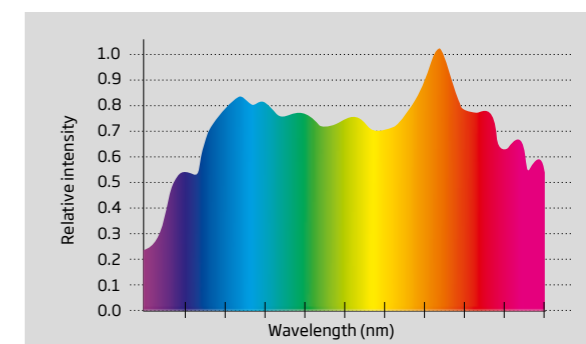


Energy in the morning ● Happiness at midday ● Relaxation in the evening

4000 K white + blue-enriched light 4000 K-3000 K white light 3000 K-2700 K white light



morning light spectrum



evening light spectrum

SunLike TECHNOLOGY

SunLike is a modern technology that perfectly reproduces the spectrum of sunlight. The use of purple LEDs of the highest quality supplied by Seoul Semiconductor has made it possible to create a luminaire with exceptionally high color rendering. This allows products with SunLike technology to meet even the highest requirements.

SunLike's state-of-the-art LED solutions have been awarded the **2019 German Innovation Award** in the "Lighting Solutions" category.

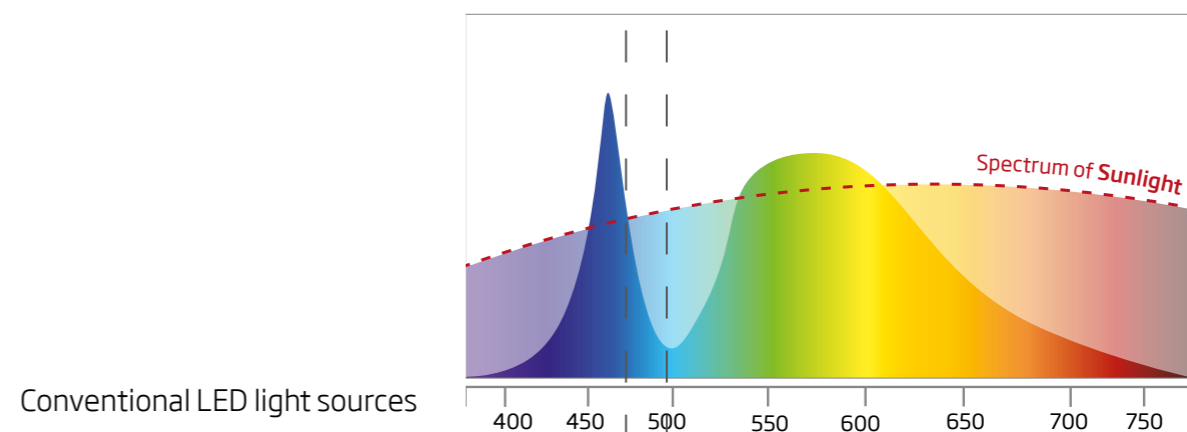
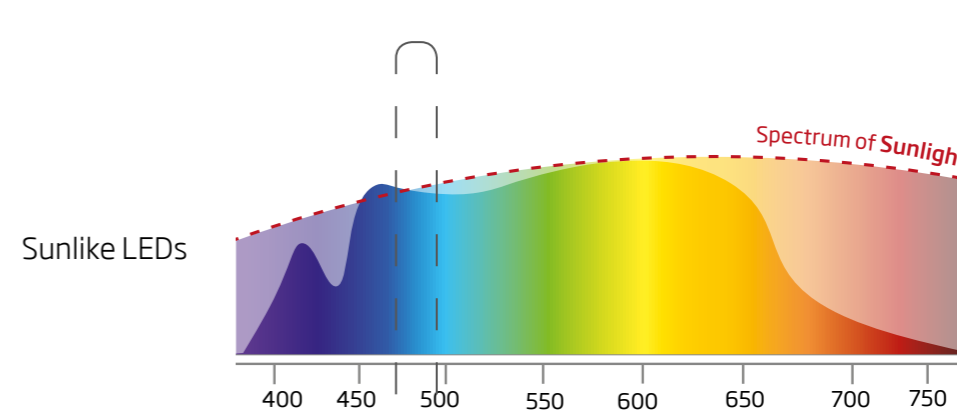


the first LEDs in the world that produce light that closely matches natural sunlight

The latest research conducted by the Society of Light and Lighting confirms the positive effect of SunLike on the human body in comparison to traditional LED light sources. The report published in March 2019 highlighted the following special features:

- Improved visual comfort
- Reduced drowsiness and higher alertness
- Better mood in the morning and evening
- Deeper sleep due to the influence of delta waves

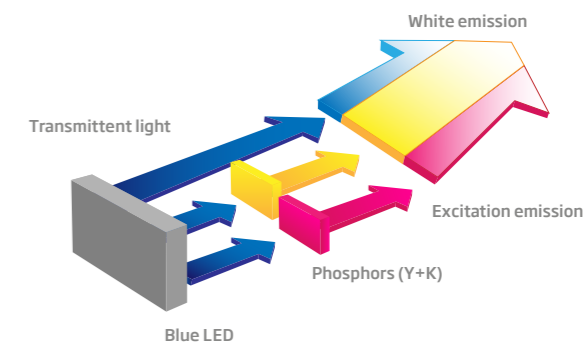
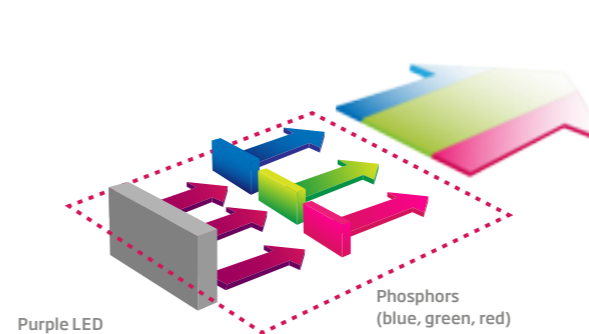
An additional advantage of CIRCADIAN luminaires is the possibility of fully utilizing the DY-NAWHITE function, i.e. the smooth regulation of the white color temperature within a range between 2700 K to 5000 K while maintaining a constant luminous flux.



480 nm

SunLike LED

Regular LED



A NOBEL PRIZE FOR RESEARCH ON THE CIRCADIAN RHYTHM

The Nobel prize for medicine and physiology in 2017 was awarded to Jeffrey C. Hall, Michael Rosbash and Michael W. Young - scientists who contributed to explaining the molecular mechanism of the daily activity rhythm, i.e. the CIRCADIAN RHYTHM.

FACTS

- ◆ The greater the energy of the blue light with a specific wavelength, the better the effect of the suppression of melatonin release
- ◆ The minimum duration of exposure to blue light in the morning hours required in order to provide the lasting effect of stimulating human activity is 90 minutes
- ◆ Blue light exposure is not recommended prior to bedtime
- ◆ Circadian rhythm disorders can lead to cardiovascular disease, hormonal problems, and above all, mental disorders such as chronic fatigue or depression

THE HEALING POWER OF LIGHT

The effects of CIRCADIAN technology are being investigated by therapists from the Järvenpää Hospital in Helsinki, where a light treatment room has been set up. This room has been equipped with ES-SYSTEM TRANSPARENT and OPPOSITE luminaires with CIRCADIAN technology. These innovative products emit light that aids the therapy in patients with depression and seasonal mood disorders.

“The right-timed exposures to light benefit not only the treatment of seasonal mood disorders, but also that of non-seasonal depressive disorders and circadian rhythm sleep disorders. Thus, the concept of CIRCADIAN fits in the evidence-based approach to the treatment of the aforementioned mental disorders and supports their clinical management.”

Timo Partonen
Doctor of Medicine
National Institute for Health and Welfare, Finland

ES-SYSTEM is the only company in Poland that has gained recognition as one of the world's leading players on the Human Centric Lighting market in the independent report “Human Centric Lighting Market Research Report - Forecast to 2023”.

LIGHTING DESIGN IN ACCORDANCE WITH THE CIRCADIAN RHYTHM

Designing lighting in accordance with the circadian rhythm is a fundamentally different process than standard lighting design. The traditional approach is mainly focused on ensuring visibility and uniformity, minimizing glare, providing good color rendering and safety. When designing lighting in line with the concept of Human Centric Lighting, it is important to consider the light intensity, the quality and composition of the light spectrum, and the exposure time. If the light emitted by a luminaire is meant to effectively strive towards imitating sunlight, it cannot shine in a concentrated beam onto one spot. Scientific research shows that the most effective luminaires for this purpose are ones that work on large surfaces, and, like the sun, not only directly illuminate certain areas, but also use reflective light off the walls and surrounding items.

ES-SYSTEM has introduced the CIRCADIAN technology to a whole range of luminaires that can be successfully used in offices, schools, lecture halls, conference rooms, as well as hospitals, retirement homes, and private homes and apartments. The products vary in design and have many different applications, allowing you to suitably arrange any interior.

LUMINAIRES WITH CIRCADIAN TECHNOLOGY FOR SELECTED SPACES



Schools and universities
- lecture halls, auditoriums,
classrooms, libraries, gyms



Hospitals - doctor's offices,
staff rooms, treatment rooms,
patients' rooms



Offices - individual offices,
open spaces, break rooms,
conference rooms



Hotels - restaurant facilities,
leisure facilities, wellness and spa
facilities, offices



Production plants - areas
without access to daylight



Shopping centers -
passageways, sales facilities



Residential areas - rooms
where people can work, study
or rest

LIGHTING CONTROL SYSTEMS

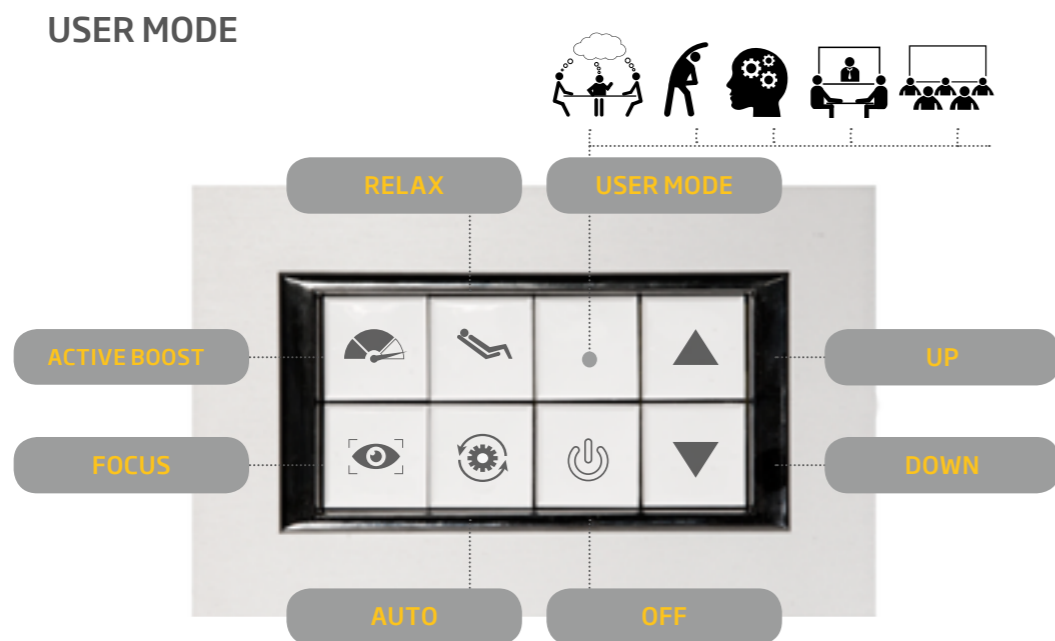
CIRCADIAN – wired lighting control

- An electrical installation with 5-core wiring – for power supply and the DALI communication bus
- Installation on the VERTEX controller's power board (code no. 8751003) supporting up to 192 CIRCADIAN luminaires
- For luminaire quantities above 192, the corresponding number of VERTEX (or other) controllers must be added via Ethernet
- Configuration using a convenient web-based application:

Automatic location of CIRCADIAN luminaires in the system
 Assigning luminaires to lighting control groups and zones
 Selecting predefined lighting schedule scenarios or configuring own scenarios
 Configuration of control panels for manual control

FLEX

is a lighting control box designed for use in facilities with high aesthetic requirements regarding the design and finish. It's equipped with eight self-reset buttons with descriptive icons for easy use.



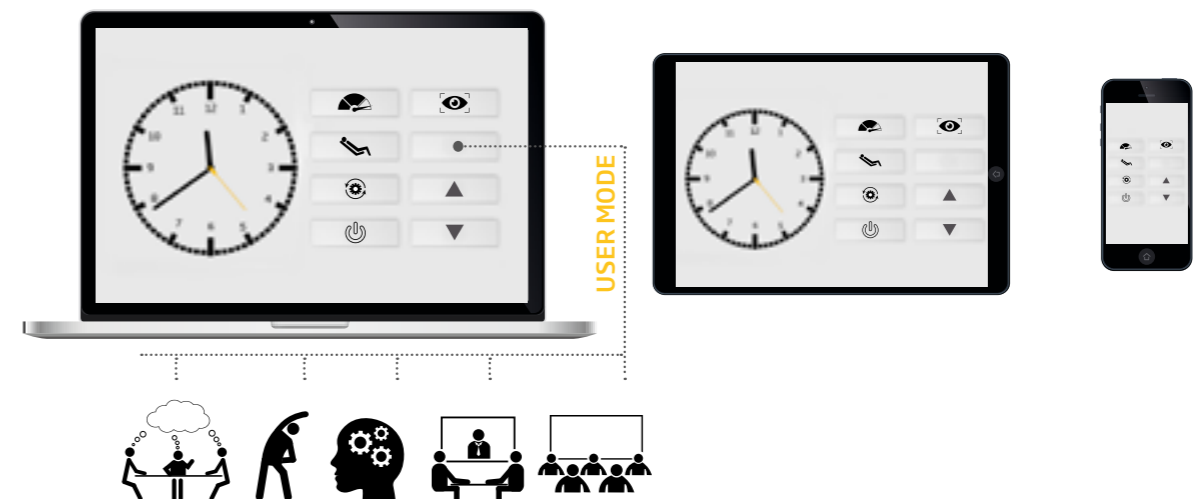
CIRCADIAN – wireless lighting control

- A standard electrical installation with 3-core wiring – a control bus is not required
- Functionally limited to small, local installations
- Programming the installation using a mobile app:

Creating a working network
 Authorization (adding) luminaires to the network, work group configuration
 Configuration of scenes and lighting schedules
 Configuration of control panels for manual control

MODULAR UI

is a functional user interface designed for lighting system control. The Modular UI application is fully responsive, perfectly adapts to all devices, and can be easily used on computers, tablets, smartphones and V-TOUCH operator panels.

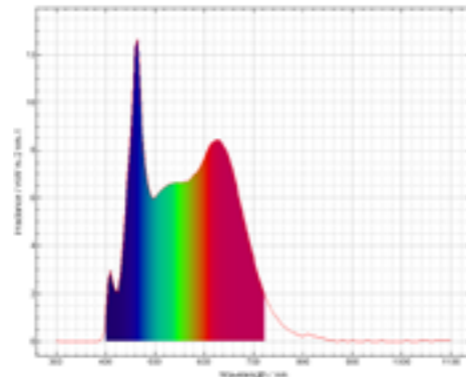


PREDEFINED MODES

ACTIVE BOOST



Affects the suppression of the melatonin secretion process and increases activity. In a time of globalization on the labor market, with international cooperation in various time zones, employees often perform their duties in the afternoon or even at night. The ACTIVE BOOST mode will ensure excellent focus and increased activity regardless of the time of day and access to natural daylight.

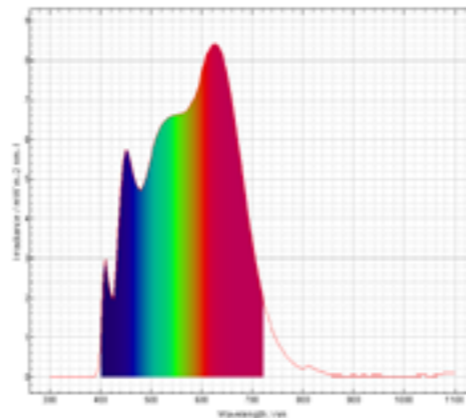


4000 K white light + blue LEDs

RELAX



Comfortable sofas and armchairs have become a standard in offices, social rooms and relaxation zones, and some companies even have multimedia zones and gaming equipment. These types of spaces are an ideal way to ensure an active work environment and a setting for relaxed meetings.

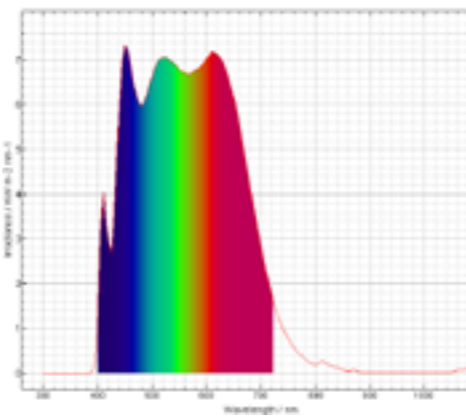


2700 K (in the afternoon) - calms and relaxes

FOCUS



Optimal lighting conditions make it possible to conserve energy, motivates teams to stay active, and ensures the ideal conditions for effective work throughout the entire day. The FOCUS mode provides employees with exceptionally comfortable working conditions, allowing them to productively complete their tasks.

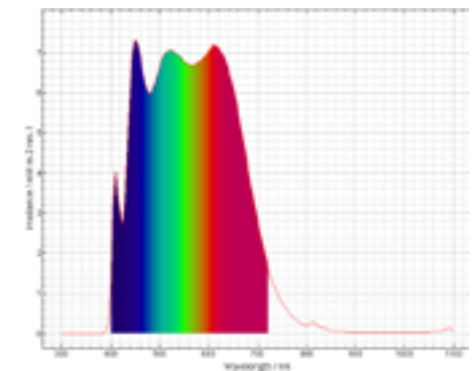


4000 K white light - optimal for office work

AUTO



Lack of access to natural light or changing outside weather conditions can negatively impact employees' moods and cause a decline in energy levels and a deterioration in performance at work. The AUTO mode is an innovative combination of systems that mimic natural daylight with an adaptive lighting function. This makes it possible to automatically change the color temperature over time depending on a programmed schedule that is consistent with the circadian cycle. The color temperature of the light affects users' moods and well-being. Warm, yellowish light calms the senses and relaxes, whereas cool, white light mobilizes and stimulates activity. The parallel cooperation of these two systems makes it possible to intensify the positive experience of the lighting users. The function of adaptive lighting is carried out using sensors that collect information about the daylight intensity and the number of people present in a given room, and by automatically adjusting the lighting intensity of individual luminaires, ensuring comfortable and safe working conditions.



An automatic operating mode that takes into account the human circadian rhythm as well as access to natural daylight

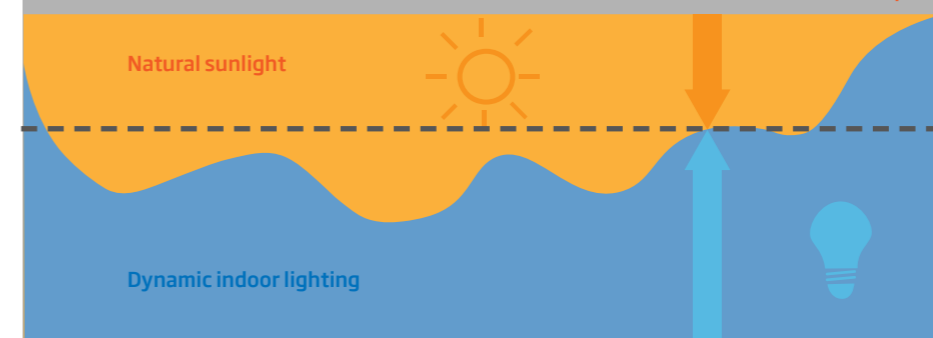


Light profile throughout the day light sensor light sensor light sensor

Automatically adapted luminaire power: 20% 40% 60%



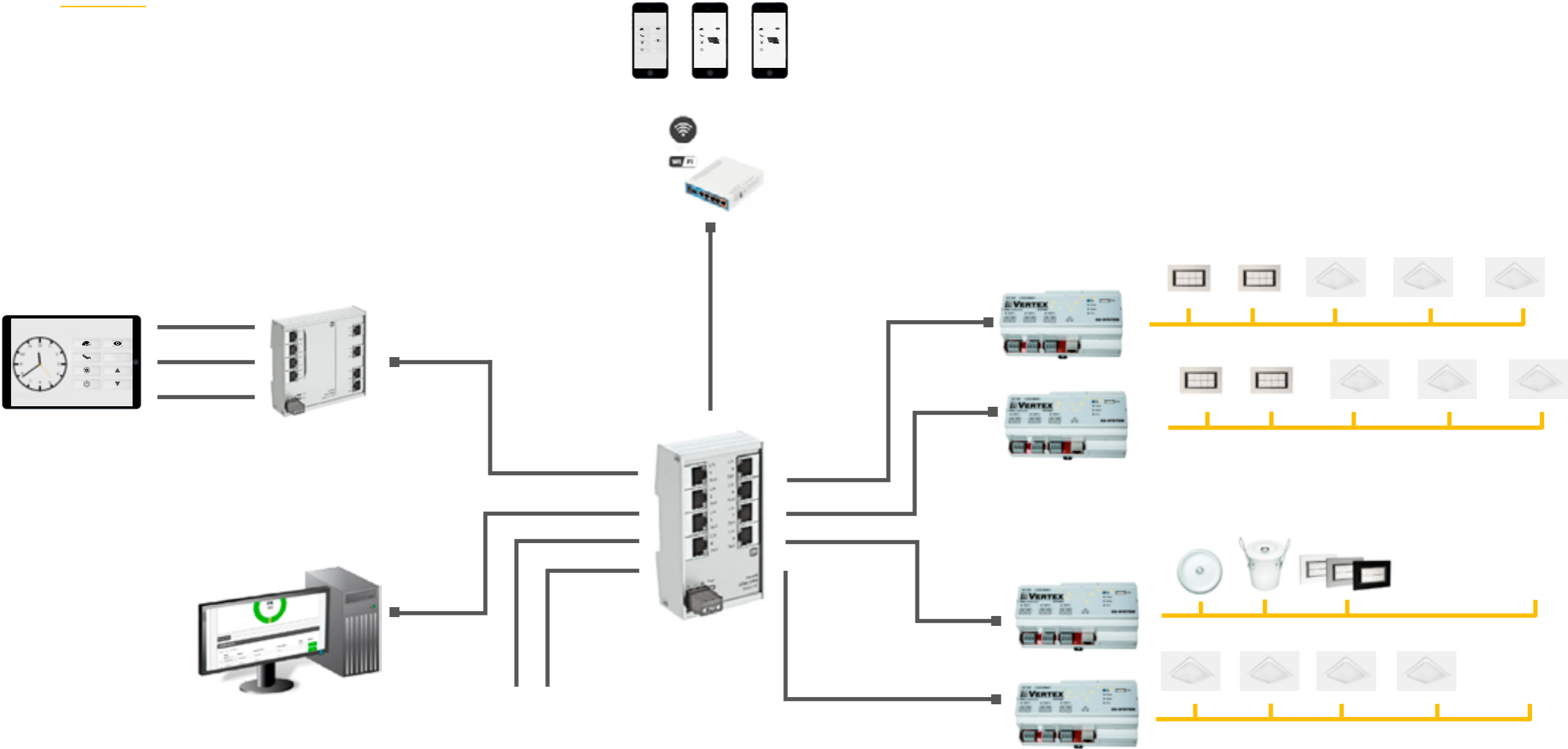
6:00 a.m. Constant overall brightness level 8:00 p.m.



Constant overall brightness level

Each of the designed modes can be activated both in the wireless version via the intuitive app, and in the wired version by using the control panel.

LIGHTING CONTROL SCHEME



A comprehensive, versatile and intuitive lighting control system operating scheme. Unlimited supervision over the entire lighting installation, maximum user comfort and reliable operation

FUNCTIONALITIES



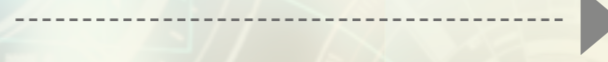
Improving working conditions and efficiency through exposure to blue-enriched white light



Production plants
Offices
Schools
Homes
Apartments



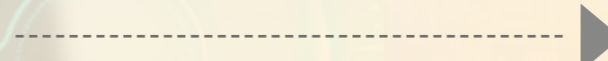
Improving well-being - a full light spectrum in accordance with the natural daily cycle



Hospitals
Senior living facilities
Offices
Schools and universities
Hotels
Homes
Apartments



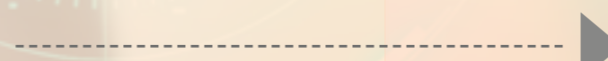
A stimulating effect - through exposure to a blue-enriched white light



Production plants
Offices
Schools
Shopping centers
Homes
Apartments



Daily cycle regulation - according to the appropriate time zone



Hospitals
Schools
Offices
Production plants
Homes
Apartments

LUMINAIRES EQUIPPED WITH CIRCADIAN TECHNOLOGY

TRANSPARENT CIRCADIAN

A pendant luminaire with direct and indirect light distribution for modern interiors. Thanks to its lightweight construction and light characteristics, it's suitable for both open space and smaller offices. The unique light distribution technology ensures excellent illumination in any interior without causing unpleasant glare.



OPPOSITE CIRCADIAN

OPPOSITE is the ideal office lighting solution. The innovative optics significantly minimize glare, ensuring exceptional working comfort. The luminaire's unique design makes it suitable for elegant office interiors.



OPPOSITE CIRCADIAN
The Top Product at the 2018
ActiveOffice Awards

The Eurocres ActiveOffice AWARD is the first of its kind and is awarded to outstanding solutions that promote an active and healthy lifestyle in the workplace.



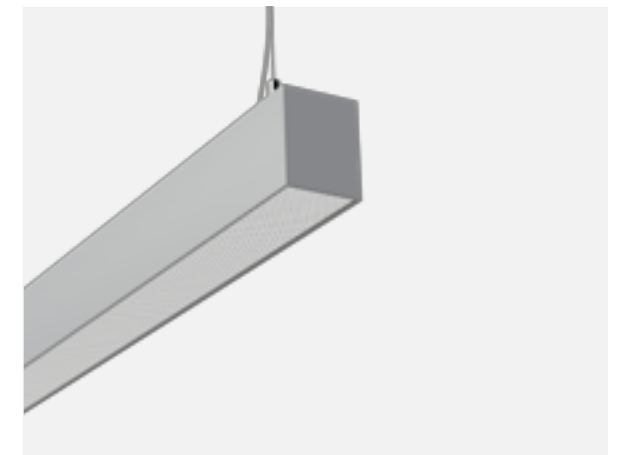
CLOUDS CIRCADIAN

A system of wall- or ceiling-mounted luminaires reminiscent of clouds in the sky. Perfect for the illumination of office spaces for creative work, children's playrooms, sports facilities, as well as stores and shopping center corridors. The luminaires can be combined in groups, creating unique visual scenes.



SYSTEM FX 65 CIRCADIAN

An expression of modernity and infinite arrangement possibilities. The minimalist luminaires with a subtle appearance are used primarily to illuminate rooms and corridors in office and public buildings and shopping centers.



LUNA CIRCADIAN

Emitting light all over its surface, LUNA offers unlimited arrangement possibilities. Thanks to a diffuser made of thermoelastic foil, this product can be given any shape you can imagine, lending any interior a unique character.





We've used luminaires with CIRCADIAN technology in an impressive facility – the Sundvolden Convention Center in Norway. The LUNA and linear S6000 systems are designed to emit light in a way that will most effectively aid concentration, improve the mood and alertness of conference and lecture participants.



The Sundvolden Convention Center has an area of over **1200 m²**. The facility was equipped with **80 LUNA CIRCADIAN** luminaires and over **200 meters of linear S6000 CIRCADIAN** luminaires.



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