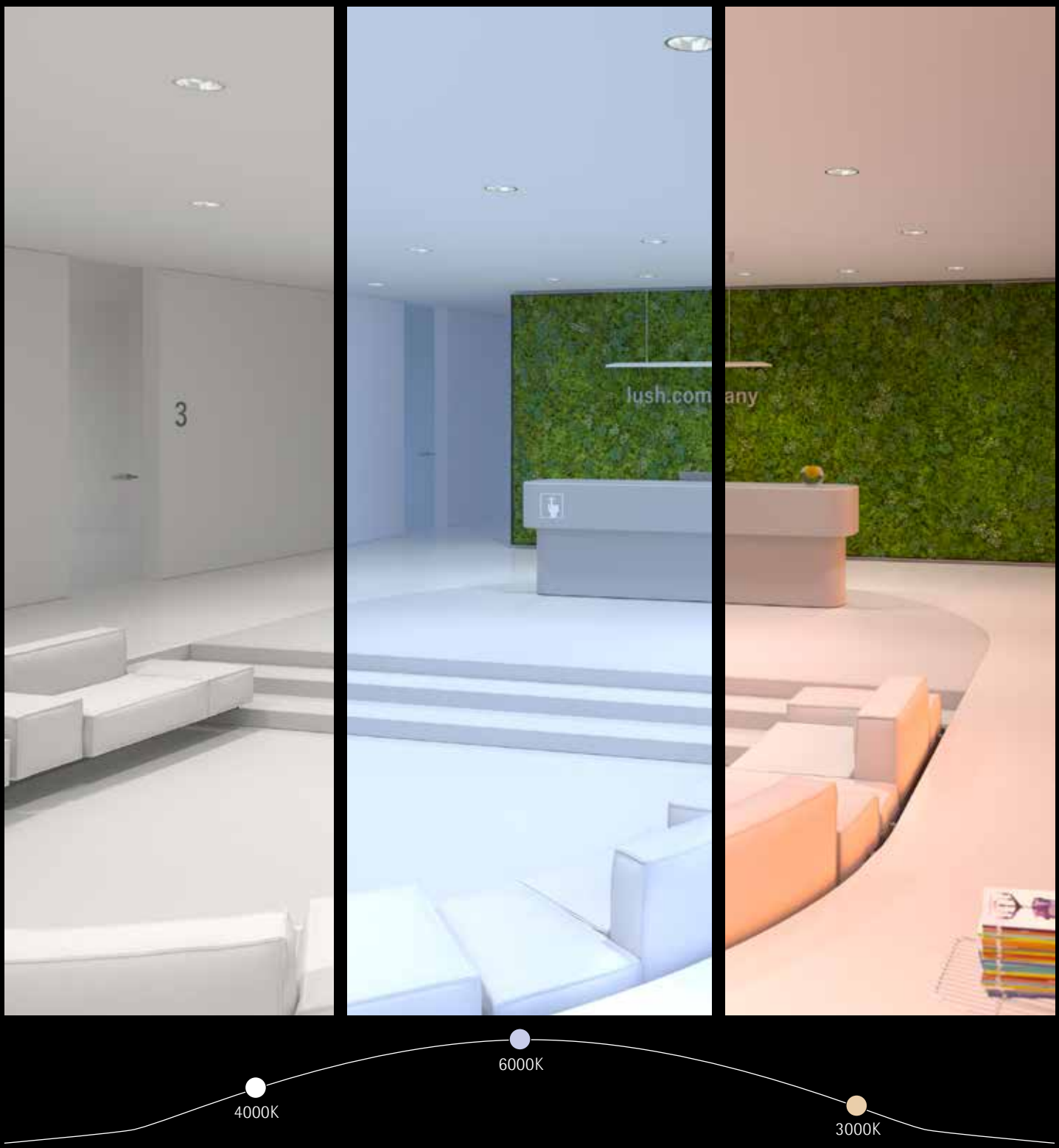
ERCO

LED Lighting

ERCO digital lighting tools



Editorial
Light is the fourth dimension of architecture

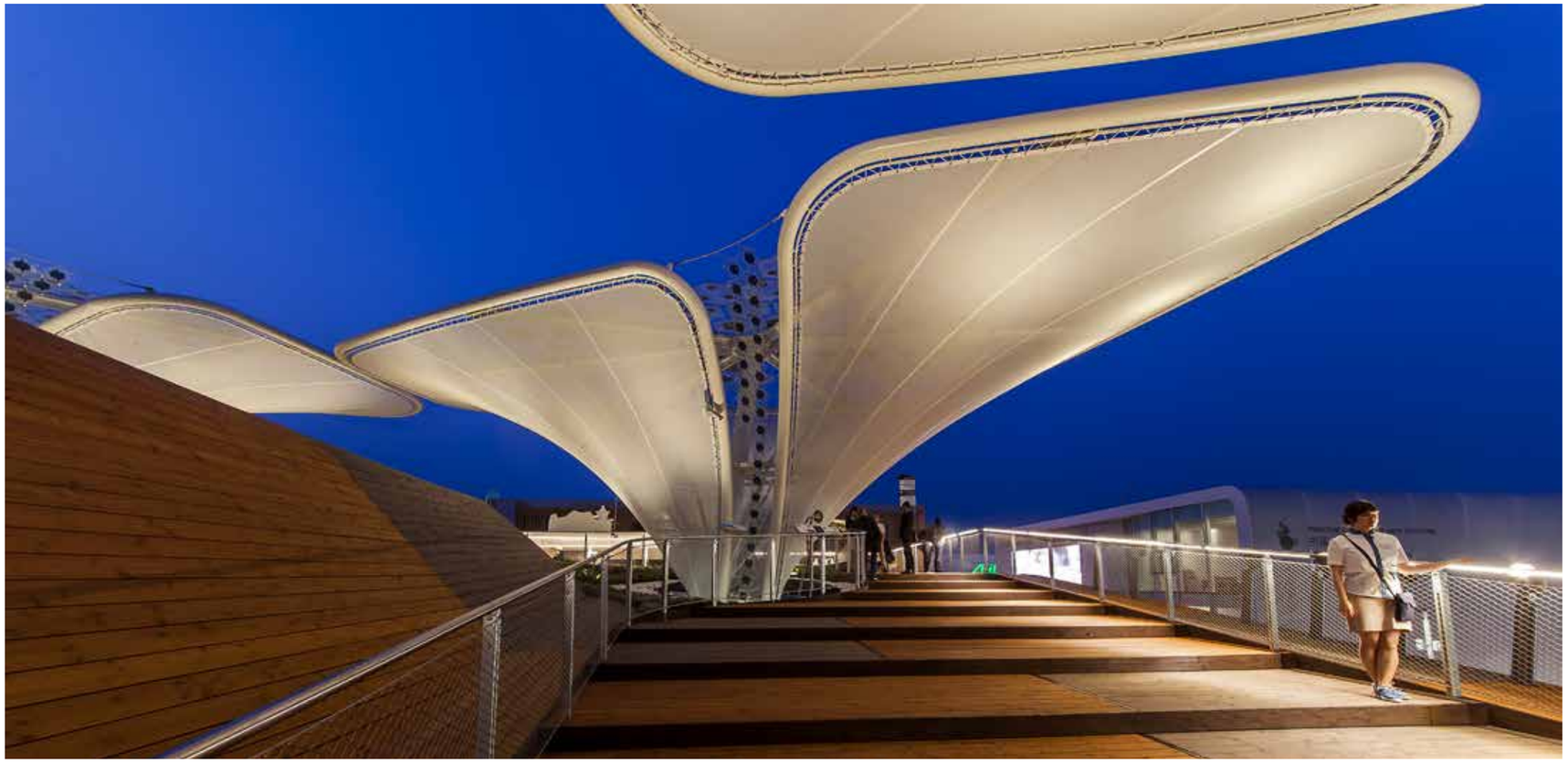
"You can't live on fears." ERCO founder Arnold Reininghaus lived by these words, and today, they still characterise our family business.

Founded in 1934, ERCO began to explore architectural lighting in the sixties and became instrumental in establishing this new field in Europe. Barely 50 years later, the company has emerged as the first traditional luminaire manufacturer to migrate to a product range based completely on LED technology. The dauntless determination to confront new issues and technologies early on while adopting a consistent approach was the backbone that today has established ERCO as a leading specialist in architectural lighting with premium digital lighting tools.

This mindset also explains our clear and consistent approach to the application of architectural lighting: We consider the immaterial material known as light a design tool to create ambience by modelling and dividing up space and objects using subtle or striking illumination for scenic effect. It follows that light must be understood as the fourth dimension of architecture. With this in mind, ERCO develops lighting tools as a modular toolbox system designed to achieve user-based and perception-orientated lighting concepts. In times of dwindling natural resources, we are also responsible, as a luminaire manufacturer, for upgrading our products consistently, ensuring maximum efficiency in use and maintenance.

As a logical consequence, ERCO is devoted to perfecting LED technology by focusing on our expertise in optoelectronics. We have reconsidered architectural lighting with LED in every possible aspect, from light generation and light guidance through to light control, ensuring now and in the future that we only supply highly efficient and economical light for any spatial setting.

Please allow us to give you some insight into our development work, outlining the unique strengths and features of our LED technology, to demonstrate the true added value of ERCO lighting solutions.



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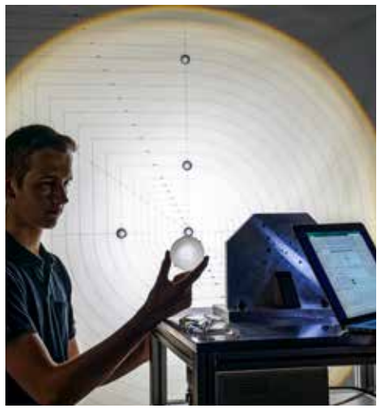
Engineering excellence for the light of the future
Global concepts, created in Germany



ERCO develops, designs and produces all the digital lighting tools at its Lüdenscheid base on the southern edge of the Rhine-Ruhr metropolitan area, in an award-winning facility including laboratories, production and offices, that has been recognised for its architectural merits.

ERCO creates pioneering architecture from its passion for innovative lighting technology. The synthesis of our perfec-tionist approach to technical detail and our strategic insight into sustainable, sophisticated and user-oriented architectural lighting permeates every aspect of our work. It is defined by a holistic mind-set that centres on close interdisciplinary collaboration with lighting technicians, design and production engineers, and designers. This dynamic dialogue between the ERCO experts manifests itself in highly efficient and agile product development and enables us to drive innovations, regularly launching premium products at a fast pace.

Efficient visual comfort
Lighting needs energy. Manufacturers, planners, engineers and users bear the responsibility for a far-sighted handling of our limited resources. ERCO meets this challenge with a strategy of efficient visual comfort and improves both energy efficiency and quality of light. ERCO has formulated five features for this form of user-oriented lighting design which is based on human perception and forms the benchmark for product development: qualitative lighting design, vertical lighting, effective lighting technology, intelligent controllability and efficient LED technology.

Research and development
As a cosmopolitan company with a global brand, ERCO keeps its finger on the pulse of the international lighting and architecture scene, allowing us to translate major trends in technology and design into sophisticated lighting tools. Considering that the quality of the lens system has a huge impact on the characteristics, performance and efficiency of an LED luminaire, ERCO sees a focus of its development work on optoelectronics as the interface between optical systems, electronics and information technology. All products are tested in our in-house laboratory to ensure that they meet the highest standards of performance, light quality and longevity. This holistic approach of considering light as a single unit, from the specification of LEDs to the development of lens systems and control gear through to the creative challenges of a targeted design concept for each project, enables us to guarantee a consistently high quality of our products based on state-of-the-art LED technology.

Product design
From the corporate architecture of our factory through to the clear style of our lighting tools and our meticulous corporate image – design has always been at the heart of ERCO's process. With conceptual strength and high levels of creativity, the in-house design team works to create an independent vocabulary of design for our product portfolio that, in the sense of functional minimalism, corresponds to LED technology. At the same time, our team is permanently engaged with advancing our archetypal, modular system principles, whereby aesthetic aspects of spatial design are given the same attention as functional parameters such as efficient thermal management and glare control. Available in several sizes and with different mounting options, the luminaires in the ERCO range offer an appropriate solution for a wide variety of applications as well as spatial settings and dimensions.

Production and assembly
From electronics production to toolmaking, plastics production, metal processing and assembly, the ERCO teams carefully accompany and optimise all production processes at the ERCO headquarters to increase efficiency and quality in the long term. ERCO even produces its track in-house in order to offer lighting designers and electrical contractors the best possible infrastructure for installing the lighting systems. Our suppliers are just as carefully selected for lasting partnerships built on trust. Working closely as a team, with short distances between development and production, ensures that ERCO customers can rely on our products 100%.

ERCO individual
With its "ERCO individual" service, the Light Factory offers extensive options for the individualisation of product ranges as well as support in the development of sophisticated special luminaires. To better adapt luminaires to the requirements of the specific project, ERCO individual offers the adaptation of series products, for example with use of alternative LEDs, over 10,000 additional housing colours, individual mounting solutions and special solutions for integration into complex building control systems.

LED light in real life

ERCO is dedicated to optimising the use and character of indoor and outdoor architecture with light. Our lighting tools are developed in close collaboration with architects, lighting designers and electrical consultants, whereby we harness the full potential of LED technology to develop products on the basis of efficient visual comfort. Emphasis in our approach is given to the principles of qualitative lighting design for optimum structuring and effective illumination of space combining superior glare control with energy efficiency and longevity based on state-of-the-art LED technology. ERCO develops lighting tools used primarily for applications in the following fields: Work, Culture, Community, Shop, Hospitality, Living, Public and Contemplation. The following pages demonstrate that our LED technology adds real value to any application.

Work

The Memocorp office in Sydney is equipped with efficient ERCO LED luminaires. Using downlights with LED technology as the core of the firm's lighting concept adds structure to the ceiling whilst offering an aesthetically appealing alternative to linear fluorescent luminaires. Qualitative lighting design for offices gives focus to efficient visual comfort with precise zoning to meet the relevant standards while responding to human perception and ensuring an economic use of the luminaires. In addition, ERCO LED luminaires set standards in office lighting with excellent efficiency and low maintenance requirements.

Shop

Light in fashion stores, car dealerships, supermarkets and shopping malls must offer the flexibility required to readjust the luminaires to periodi-cally changing product presentations. In the Melissa flagship store in Singapore, LED light from ERCO sparklingly presents the latest fashions in footwear, supported by outstanding colour rendering.

Culture

ERCO is well known for fulfilling the challenging demands of museum lighting with superior solutions, leading to an extensive range of projects worldwide. In the Polygon Gallery in Vancouver, very good colour rendering and UV-free LED light are used for the caring presentation of art. LED light stages exhibition concepts and architecture with absolute precision, exceptional uniformity and remarkable brilliance for an optimised visual experience.

Community

Architectural lighting in educational, administrative buildings and circulation areas, such as here in the atrium of Solent University in, has to illuminate large rooms which have high usage with maximum efficiency. LED technology offers an ideal solution combining exceptional energy performance with high levels of luminous flux and low maintenance requirements.

LED light in practical applications

Living

Interior and exterior lighting creates an ambience of well-being in the residential house in Lower Saxony. Light in the living room has to meet a wide variety of requirements from illuminating the dining table and reading chair to work areas in the kitchen and at the desk. The precision of the LED lighting technology offers the advantage of being able to individually adapt light to the task at hand with diverse light distributions. It succeeds with a pleasant colour temperature, outstanding colour rendering and high uniformity - as well as excellent energy efficiency.

Hospitality

In the restaurant area of the Oriocenter shopping centre in Bergamo, the seating areas are illuminated with warm white light. Light in restaurants, bars and hotels should create an ambience that reflects the relevant gastronomic concept. LED lighting tools offer excellent colour rendering properties to enhance the fresh look of meals whilst intelligent lighting control makes scenic lighting uncomplicated and adjustable. Highly precise beams of uniform light segregate the dining area, bar and lounge using appropriate lighting designs.

Public

The remarkable results of using LED light to illuminate historic monuments or public squares are indisputable. The relighting of the Imperial Forums in Rome are the perfect example, using either warm white or neutral white light, with precise light distributions, to emphasise façades and ornamentation that reflect the symbolic character of this site. LED lighting tools are ideal for outdoor applications, offering high visual comfort, a robust design and minimum maintenance.
Photo: Vittorio Storaro, Rome

Contemplation

LED lighting tools support an ambience that befits the dignity of sacred buildings whilst enhancing the symbolic nature of light in religion. As well as strengthening the tranquil atmosphere in the room with meticulously defined, uniform illumination, digital luminaires accentuate liturgical elements such as altars with precise light distributions, emphasising ornamental details and wall paintings whilst enhancing the character of domes and other roofs. Control is wireless via an app in order to flexibly design the illuminance for the valuable mosaics in the cathedral at Sienna.

Lighting tools in the indoor area

Whether in contemporary designer architecture, in spacious factory lofts or pragmatic concrete constructions from the 1960s, in creative offices, concept stores or museums: ERCO lighting tools represent a comprehensive modular toolbox for a wide range of indoor and outdoor lighting solutions. Our broad variety of versatile luminaires supports architects, lighting designers and electrical consultants in implementing their lighting concepts with meticulous care to suit any spatial setting and mounting situation. Based on the intended purpose, their light enhances space with pinpoint accuracy, provides security and orientation with uniform levels of ambient lighting or produces a wide and spacious impression of the room using wallwashing. Their understated, functional design reflects the requirements of LED technology and lends ERCO lighting tools legitimacy as aesthetic architectural elements in their own right.

Transforming high rooms: Ceiling washlights
The light of ceiling washlights projected into the room enhances the protective character of ceilings whilst creating a sense of height and width, above all in rooms with low ceilings.

Directing attention: Spotlights, floodlights, wallwashers
Whether as accent light focused on a sculpture or washlighting for a shop display – spotlights, floodlights and wallwashers allow highly flexible deployment thanks to adapters for track systems, adjustable luminaire heads and a wide spectrum of light distributions.

Productive working: Workplace lighting
Flexible positioning, glare-free and dimmable – workplace lighting needs to meet individual requirements. ERCO workplace lighting brings this flexibility to any situation.

Discreet: Recessed luminaires
Recessed luminaires are deliberately toned down in favour of their lighting effect. Wide beam distribution options as well as high visual comfort enable highly uniform illumination with large luminaire spacing.

The right scale: Surface-mounted and pendant luminaires
Pendant luminaires are designed for flexible height adjustment in relation to the architecture and its use, providing economical ambient lighting with excellent glare control. As succinct architectural elements they are often used to highlight particular areas in the room.

Lighting effects for architecture: Projectors, floodlights, wallwashers
ERCO's range of robust spotlights offers the broadest possible scope for design with a diversity of light distributions, lumen categories and mounting options for any outdoor application.

Structuring space: Façade luminaires
Thanks to uniform wash-lighting of the ground and ceiling, façade luminaires ensure safety on pathways whilst defining spatial borders without spill light disturbing the environment around them.

Directive and decorative light: In-ground luminaires
In-ground luminaires are used as directive lighting and highlight entrances, trees or walls. Their distinctive upward light direction, with efficient glare control as a mandatory criterion, immediately attracts attention adding a further decorative element to the lighting concept.

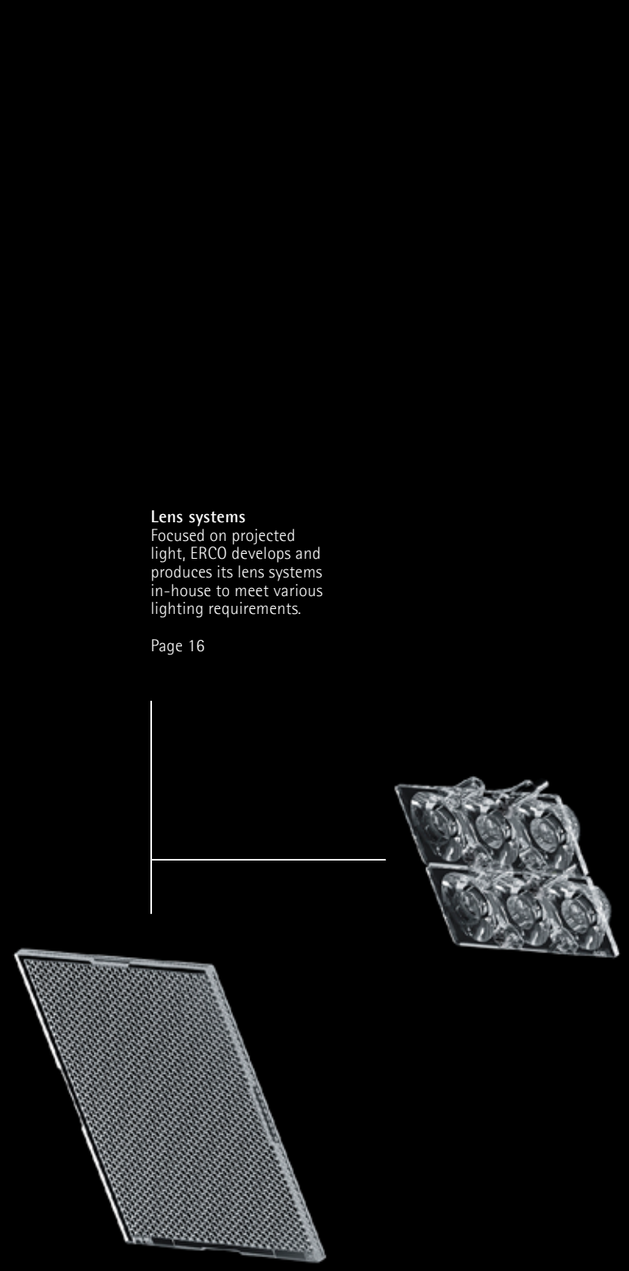
Robust ambient lighting: Recessed luminaires
Downlights, directional luminaires and wall-washers enable designers to extend perception-orientated lighting design with excellent visual comfort to the outdoor area.

Facilitating orientation: Bollard luminaires
Bollard luminaires contribute to safety by illuminating pathways, stairs and other open spaces. Dark Sky technology protects pedestrians from glare, while at the same time preventing spill light above the horizontal plane.

LED lighting technology at a glance

In 2014, the Nobel Prize in Physics was awarded to a trio of scientists who invented the first blue light emitting diode in 1995. The blue LED was the final step towards creating white light, making it the "rough diamond" for the sophisticated digital technology that ERCO has perfected in its pioneering approach in architectural lighting. In other words, it has taken ERCO less than 20 years since the invention of white LED light to develop today's highly precise, efficient and low-maintenance ERCO LED technology based on the guiding principle of projected LED light.

Considering this huge step forward in lighting technology, the following pages give you all the details of what this signifies for our products whilst providing insight into the photometric systems that explain the superior quality of ERCO LED lighting tools – extending from the various different lenses in the context of their application to LED modules and control gear through to thermal management.



Lens systems
Focused on projected light, ERCO develops and produces its lens systems in-house to meet various lighting requirements.

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LED modules
The sophisticated opto-electronic system of an ERCO LED luminaire is based on LED modules that are developed and populated in-house.

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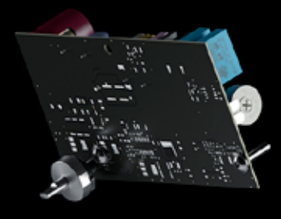

Control gear
Control gear developed in-house, for example for Casambi Bluetooth or Dali, offers a wide range of options for digital dimming and convenient lighting control.

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Thermal management
For maximised longevity and lumen maintenance, the LED modules must operate within their prescribed temperature range. Thanks to passive thermal management, all ERCO lighting tools are optimised for digital technology.

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Luminaire system
A homogeneous, modular system design with consistent quality features and characteristics across the range gives the designer flexibility in the combination of different ERCO luminaires.

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LED optical systems at a glance

Product development at ERCO always begins with a definition of the specific application of the prospective lighting tool. ERCO designs luminaires with focus on a perception-orientated approach to lighting design, based on the principles set out by American lighting designer Richard Kelly.

In the 1940, Kelly developed the "language of light", distinguishing three basic qualities of light that enable an enormous diversity of lighting solutions: Glare-free downlights or wallwashers produce ambient lighting with a soft, uniform beam to facilitate orientation – Kelly described this as "ambient luminescence". Spots with different illuminance levels accentuate objects and important areas with directed light – referred to as "focal glow". The "play of brilliants", finally, is light as an aesthetic end in itself, such as light art, moving light, chandeliers and other decorative lighting tools.

Today, these principles still provide a solid basis for qualitative lighting design – and the development of ERCO optical systems. Our modular lens system with Spherolit technology enables a wide range of lighting accents, whereas various downlight systems achieve homogeneous ambient lighting in any size of room. Uniform vertical illuminance as the ultimate challenge in lighting design takes "ambient luminescence" to a whole new level: Wallwashing optimises the visual comfort in almost any architecture, draws the user inside and directs the attention onto façades, shelves and other vertical surfaces.

Accent lighting

Different light distributions: The Spherolit lens system
In addition to the primary optic of the High-power or chip-on-board LEDs, spotlights, projectors and ground-recessed luminaires also use a system of collimator and interchangeable Spherolit lens. This results in the availability of different light distributions for hugely creative deployment in any project, whatever the shape and size of the luminaire.

Variable light beam: the zoom lens
The optic of the zoom lens allow infinitely variable adjustment of the round or oval light beam diameter by simply rotating it, enabling easy adaptation of the light to changing exhibits.

Ambient lighting

Efficient planning: The free-form lens – Skim
Skim downlights project the LED light through a drop-shaped lens that determines the light distribution. With wide flood and oval flood as its two characteristics, Skim offers a highly efficient system with superior glare control for low-cost lighting solutions.

Collimating lenses for any spatial dimension – Compact, Quadra and Starpoint
The one-piece lens system of the Compact, Quadra and Starpoint downlights combines the photometric principles of collimating and Spherolit lenses for a compact design. The curvature and surface texture of the lens determine its optical properties, offering the designer a variety of light distribution options with a wide choice of lumen packages.

Maximum visual comfort: The diffuser lens with darklight reflector – Quintessence
Quintessence downlights combine a diffuser lens with a darklight reflector for an optical system that produces an exceptionally wide beam pattern with a superb cut-off angle. This ensures uniform ambient lighting with large luminaire spacing and efficient glare control.

Maximum visual comfort: the lens system with anti-dazzle louvre – Jilly
Jilly's anti-dazzle louvre restricts the view into the luminaire, achieving high visual comfort for workstations with an emission angle of 90°.

Vertical illuminance

Uniformity and width: The lens wallwasher
The lens system in wallwashers enables the illumination of vertical surfaces, with the light beginning just below the ceiling. The elongated collimator projects the light of the LEDs onto the wall at an optimal angle, achieving uniform light distribution with large luminaire spacing. The result gives a brighter impression of the room.

Emphasising the texture: the grazing light wallwasher
The lens system in grazing light wallwashers enables the surface structure of vertical surfaces to be emphasised with a strong shadow effect. The special collimator optic with its narrow focus of the light beam can also be used without problems for high walls.

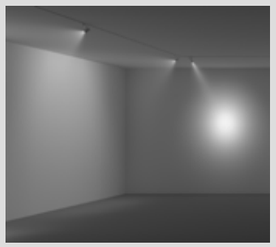
Accent lighting
Optical systems in spotlights and projectors

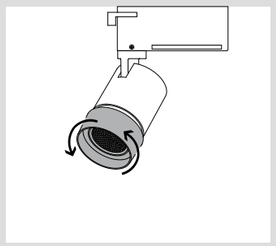
Directed light used to accentuate fashion, art, information boards, furniture ensembles or individual areas of the room – referred to as "focal glow" – creates attention and facilitates orientation. ERCO LED spotlights and projectors are highly versatile precision lighting tools designed for purposes such as the glare-free illumination of artwork, the pinpoint accentuation of product presentations, the scenic lighting of historic features or evocatively dramatic light for the event and gastronomy sector.

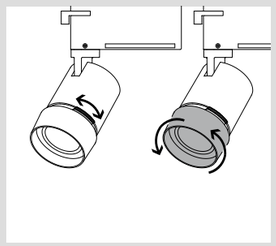
The patented Spherolit lens system, specially developed by ERCO for LED technology, stands for the broadest possible scope for design with absolute precision. Based on the principle of light projection, a collimating lens concentrates the light of the LEDs efficiently in a parallel beam without losses due to spill light. A subsequent disc-shaped Spherolit lens determines the actual light distribution for the specific application. This approach of a modular lens system, especially combined with the interchangeable Spherolit lenses, enables a broad spectrum of light distribution options, regardless of the size and output of the lighting tool. What this means is that the Spherolit lens system liberates the designer from technical and formal constraints to enable perception-orientated lighting concepts.

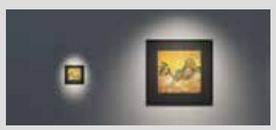
Spherolit technology for different light distributions
With their various light distributions, spotlights and projectors are universal tools for accent lighting. They create precise light beams without spill light and more uniform light for defined lighting designs.

Zoom spotlights
Zoom spotlights enable a continuously adjustable beam angle. In addition to rotationally symmetric light distribution with a zoom range from spot (15°) to wide flood (65°), an axially symmetric version with oval light beam is also available. The in-house developed Spherolit lenses bundle the light beam of zoom spotlights without any light spill. This increases the illuminance with spot by more than ten times. This also makes the optic particularly flexible and efficient for museum and retail applications.

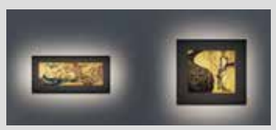




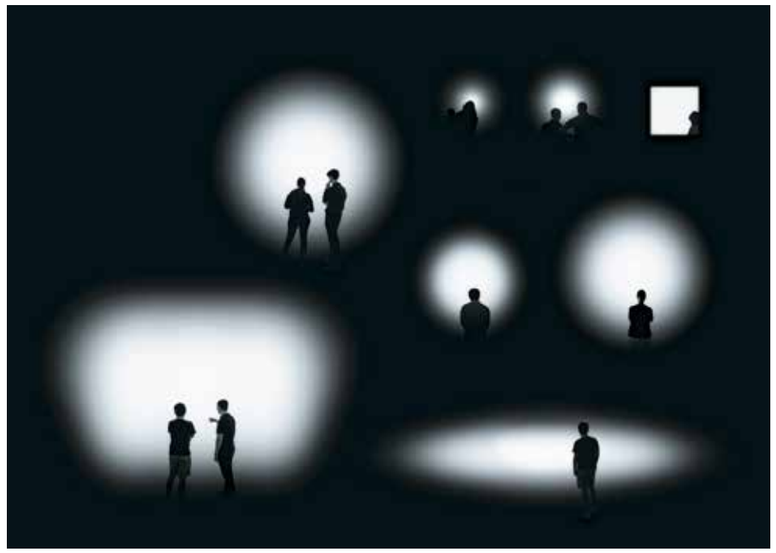




Zoom spot
By rotating the zoom lens the beam angle can be infinitely adjusted from 15° to 65°.



Zoom oval
The zoom oval light distribution is continuously variable from 15° x 69° to 65° x 65°. In addition, the alignment of the oval can be adjusted.



Interchangeable light distributions
Every lighting task requires specific lighting tools. With ERCO, lighting designers can select the most suitable light distribution for their projects from a variety of possible distributions. The interchangeable light distributions, ranging from accenting to floodlight and wallwashing, enable optimum coordination to the specific lighting task.

Ambient lighting
Optical systems in downlights

Uniform general lighting generated from luminaires integrated in the ceiling, referred to by Richard Kelly as "light for seeing", provides good orientation and conveys a sense of safety and security. Excellent glare control enhances the visual comfort required for offices, administration buildings and educational facilities as well as the home.

Almost half a century of experience in downlight development qualifies ERCO as a specialist in powerful and highly efficient LED recessed luminaires. While the flexibility of Spherolit lenses accounts for the merit of spotlights, it is the efficiency of the compact lens system in downlights that is helpful in its own right. This enables the designer to reap the benefits of ceiling-integrated mounting without limitations in the concept. Thanks to their low recess depth, downlights afford great flexibility in the coordination of the ceiling plan; the luminaire itself blends discreetly into the background, focussing users' attention on the light effects. Downlight systems with different light distributions provide the flexibility to define complete, integrated lighting concepts for related areas – such as efficient zonal lighting in the office. The rotationally symmetrical and oval light distributions enable the designer to respond individually to specific architectural features without the need to specify a different style of luminaire and without compromising on the design.

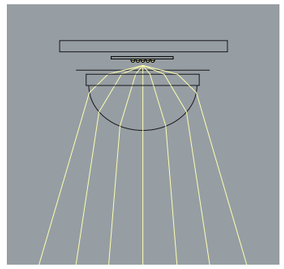
Free-form lens – efficient and glare-free
Available with wide flood or oval light distribution, Skim offers efficient visual comfort with a high light output ratio. A unique feature is the complex convex shape of the lens that lends it aesthetic appeal. Skim achieves excellent efficiency with a price to performance ratio designed particularly for projects focused on economy.

Lens system with anti-dazzle louvre
Efficient lens technology for high visual comfort: special anti-dazzle louvres prevent annoying glare for office workplaces. Despite the high illuminance on the work plane, this results in very good visual comfort.

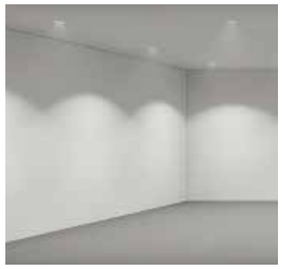
Collimating lens for small dimensions
Small size and three efficient light distributions with excellent visual comfort: Starpoint downlights encourage wide luminaire spacing even in rooms with low ceilings.

Flexible light in offices
With track as the lighting infrastructure, a flexible lighting solution is created that can be quickly and easily adapted to changing office layouts. The advantages of the downlights for track are:

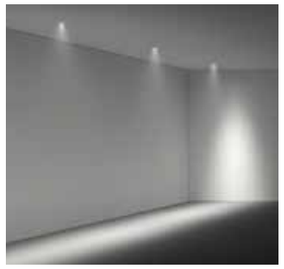
1. High visual comfort via good glare control
2. High luminous flux for sufficient brightness at the office workstation
3. Precise optics for uniform brightness on the desk
4. Good facial recognition during meetings due to wide light distributions for cylindrical illuminance
5. Wide light beams enable large luminaire spacing. This reduces the number of luminaires required as well as investment and operating costs.



Free-form lenses in downlights
The free-form lens made of optical polymer has been meticulously calculated and engineered to project soft, glare-free LED light precisely and efficiently onto the target surface.



Wide light distribution
The wide, rotationally symmetrical light distribution creates a balance between horizontal and vertical illuminances, suggesting its use for efficient ambient lighting in offices, sales areas and movement zones.



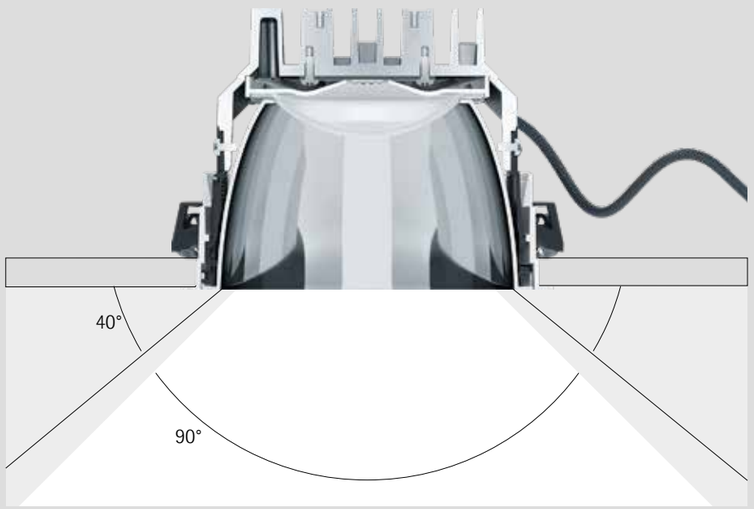
Oval flood light distribution
The oval light distribution lends itself particularly to the economical illumination of desks, merchandise tables, hallways and long aisles. Precise beam alignment is achieved by rotating the luminaire.

Ambient lighting
Optical systems in downlights

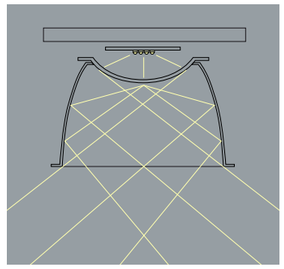
Efficient visual comfort is an essential aspect of perception-orientated lighting design. Subtle light from a virtually invisible source in the ceiling achieves its full effect only if the downlights are optimally shielded.

The photometric system of Quintessence downlights is designed for excellent visual comfort with maximised luminaire spacing. The combination of a specially developed diffuser lens and a darklight reflector achieves a 90° emission angle with a 40° cut-off, enabling the luminaires to be spaced up to 50% further apart and yet retain their high visual comfort. The extra wide flood light distribution results in superbly uniform illumination in the horizontal plane, whilst the cylindrical illuminance components ensure good facial recognition and spatial perception, making this combination ideal for high-end applications with varying user requirements, such as in educational, transport or administration buildings. Alternatively, the 60° beam angle is suitable for higher rooms and for replacing older downlights with comparable light distribution.

Diffuser lens with darklight reflector for maximum visual comfort
The lens creates a strikingly homogeneous beam, with a gentle gradient all the way to the edge, offering consistent illuminance levels with superior glare control.



The principle of maximum visual comfort
The optical system of Quintessence solves two photometric challenges at once: An exceptionally wide light distribution with a 90° emission angle as well as superb glare control with a 40° cut-off. High cylindrical illuminance with exceptionally uniform horizontal components are characteristic for this light distribution, meaning that a decrease in illuminance levels between two luminaires will be imperceptible, even if with wider spacing. For exceptional uniformity of the beam, the diffuser lens with darklight reflector allows luminaires to be spaced at roughly 1.5 times the height of the luminaire above the working plane.



Diffuser lens and darklight reflector in Quintessence downlights
The diffuser lens produces a uniform beam with amazing glare control, whilst the darklight reflector in front defines the width and cut-off angle of the light distribution, avoiding glare in the reflector.

Extra wide flood light distribution
Light distribution with an emission angle of 90° and a 40° cut-off for uniform lighting with high cylindrical illuminances.

Atrium double-focus downlights for high rooms
For efficient glare control in spaces with ceilings of more than 5m, we recommend using Atrium double-focus downlights. As well as offering the same luminaire diameter, their lens system ensures unparalleled glare control.

Vertical illuminance
Optical systems in wallwashers

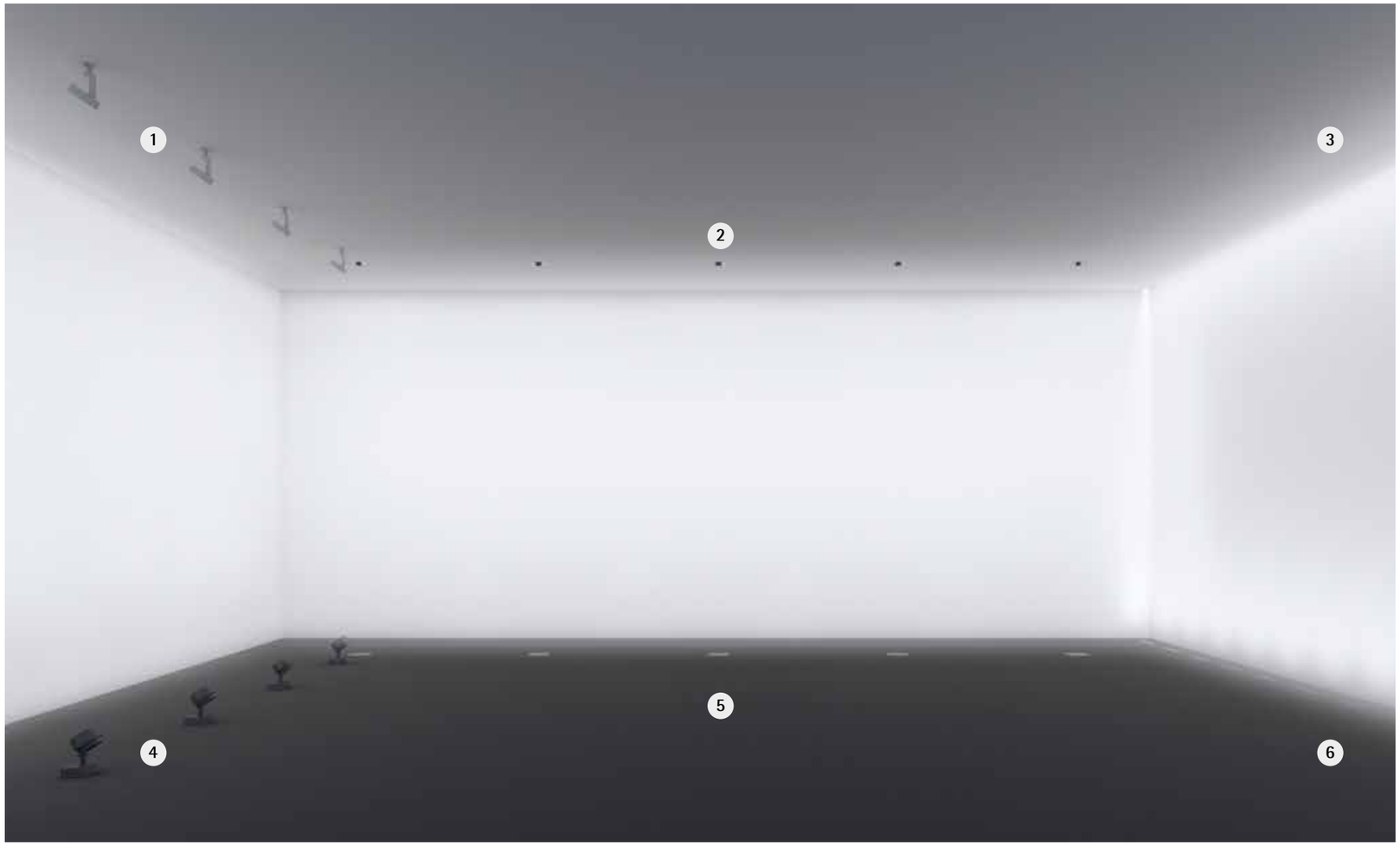
The vertical planes of an environment constitute up to 80% of our visual perception. This explains why vertical illuminance plays such a crucial role in qualitative lighting design. Wallwashing enhances the perception of space whilst increasing the impression of brightness and optimising the visual comfort by reducing contrast. Add to that the amazing effect of vertical illuminance that gives compact rooms a more spacious and higher appearance. As well as that, illuminated walls have a magical quality that lends itself particularly to enhancing the ambience in restaurants and in the home, whereas grazing light makes a feature of materials and surface structures – as on façades – for a relief-like effect. With its compelling advantages, vertical illuminance adds to the aesthetic appeal of "ambient luminescence" and "focal glow" whilst at the same time supporting efficient and economical lighting concepts in offices, administration buildings, shops, places of worship and public areas.

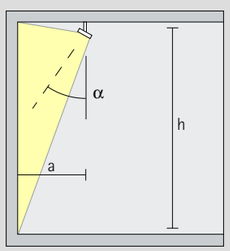
Be it from the ceiling or in-ground, close to the wall or from a great distance, for indoor and outdoor application – wallwashers are an integral part of ERCO's product range. Developed in-house with asymmetrical light distribution, the ERCO lens systems produce beams of utmost precision and uniformity.

Optical system in lens wallwashers
A linear collimating lens directs the light of neatly aligned LEDs onto a lens that in turn, refracts the beam towards the wall. A reflector bounces the light reflecting off the lens surface onto the wall zone near the ceiling.

The optical system for uniform vertical illuminance
Superbly uniform washlighting, with a homogeneous spread right up to the ceiling and seamless beam transitions are characteristic of ERCO's wallwasher technology.

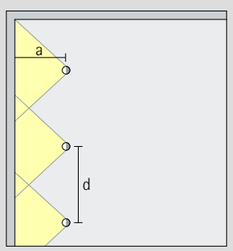
Overview of wallwashing
A primary point to consider in perception-orientated lighting design is vertical illuminance. The type and intensity of wallwashing determines the characteristic features of the lighting concept. We have summarised the broad potential of vertical illuminance with ERCO lighting tools for you here.





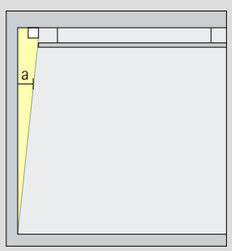
1 Spotlights
For optimum alignment of track-mounted lens wallwashers positioned at an ideal offset from the wall, the spotlights should be tilted at an angle (α) of 35°.

Rough guide: α = 35°
Rough guide: a = 1/3 x h



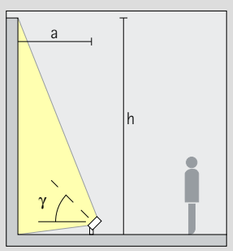
2 Lens wallwashers
Depending on the type of lens wallwasher, the luminaire spacing (d) for some wallwashers may be up to 1.5 times the offset from the wall (a).

Rough guide: d ≤ 1,5 x a
Rough guide: a = 1/3 x h



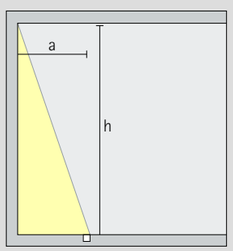
3 Recessed grazing light wallwashers
Arranged in a linear configuration in the ceiling, with spacing of up to 10cm, grazing light wallwashers such as Lightgap achieve good uniformity on the wall.

Rough guide: a = 10cm



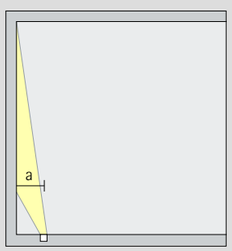
4 Projectors
For optimum alignment to achieve efficient wallwashing using projectors positioned at an ideal offset from the wall, the luminaires should be tilted at an angle (γ) of 55°.

Rough guide: γ = 55°
Rough guide: a = 1/3 x h



5 In-ground luminaires
Similar to recessed luminaires for ceilings, the ideal offset from the wall (a) for in-ground luminaires is around one third of the wall height (h).

Rough guide: a = 1/3 x h



6 In-ground grazing light wallwashers
As a grazing light wallwasher, the Site in-ground luminaire produces excellent uniformity with a wall offset (a) of around 20cm.

Rough guide: a = 20cm

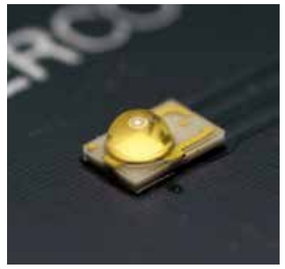
LED modules

How can you define the quality of LEDs? Look at the actual diodes, but more so, consider them in context, in other words, on the printed circuit board. ERCO only sources LEDs from leading manufacturers, specifying the highest standards of luminous flux, luminous efficacy, colour rendering, colour locus and consistent electronic characteristics in mass production. The LED binnings used are updated every year for new product development as well as to guarantee that existing ERCO luminaires are equipped with only the most advanced technology.

Committed as always to meeting the highest standards of quality and quantity, ERCO develops and populates its LED modules in-house. To achieve the intended light effect with maximum efficiency, the layout for each separate light distribution is created with painstaking attention to detail and matched individually to the right lens system. This ensures that ERCO is always in control of the heart of its lighting tools, enabling exceptionally efficient and brilliant light with superior lumen maintenance through to the end.

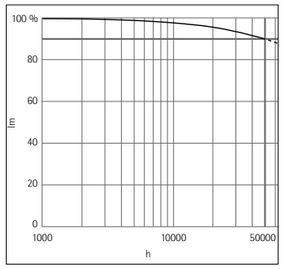
Why ERCO LED modules?
It is only when all the system components are designed for optimum compatibility that LED luminaires guarantee high efficiency and a long functional life. With this in mind, ERCO designs and produces its LED modules in-house and will re-place any module that develops a fault due, for example, to overvoltage. Within a given production year, ERCO always uses the latest generation of LEDs based on optimised binning parameters.

For clear identification of the LED modules even after an update, ERCO specifies a ten-digit version number alongside the article number, which is found on each luminaire. This number, which applies to a luminaire range, remains the same and bears no reference to the LED generation. The latest generation of LEDs is always used in spotlights and downlights.

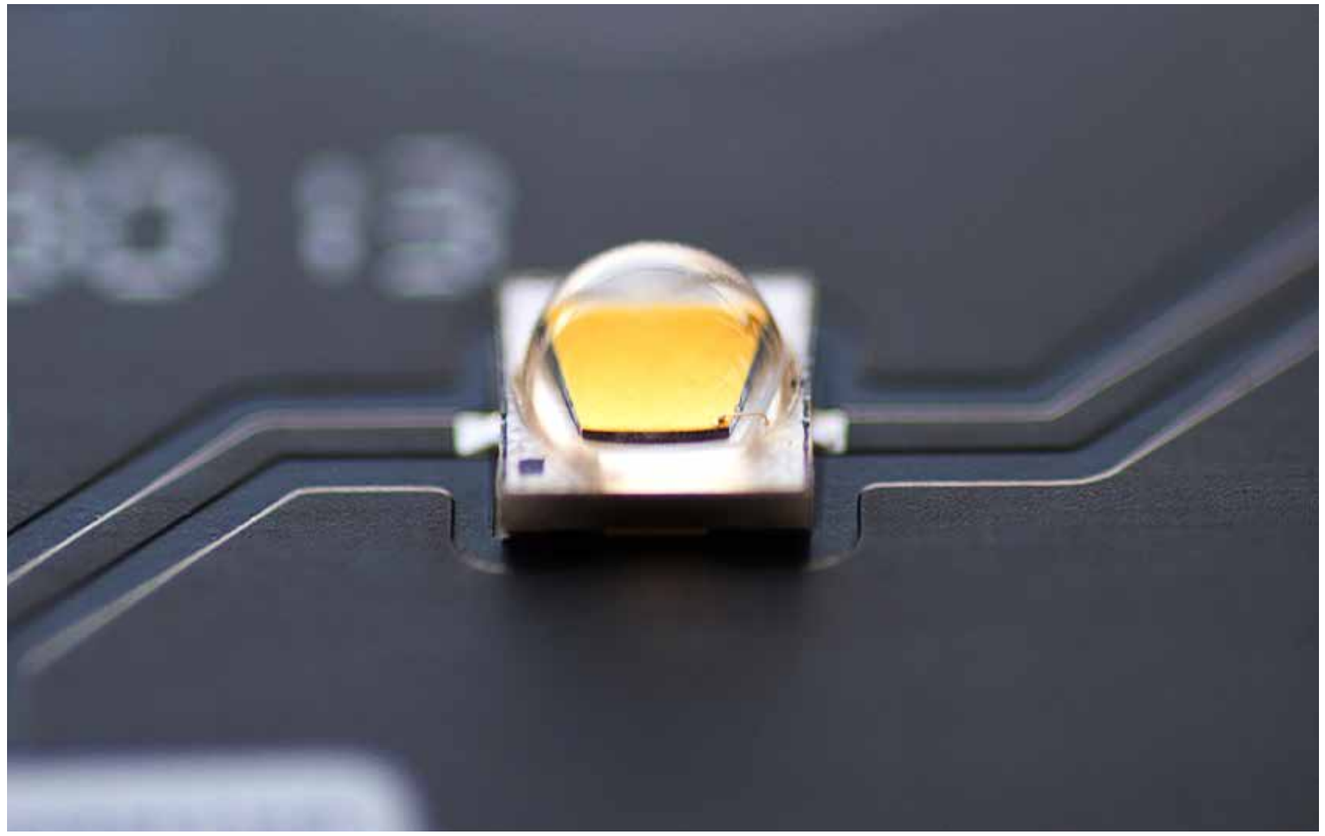


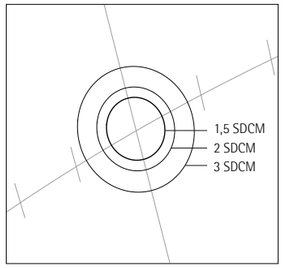
ERCO LEDs
ERCO uses High-power LEDs, chip-on-board LEDs or Mid-power LEDs in its LED lighting tools. At 700mA the power consumption of a High-power LED is around 2W. This results in a luminous efficacy of 138lm/W for neutral white LEDs and 105lm/W for warm white LEDs (status as of 2019). The advantages of the respective LED types for different applications are explained on the next page.

In-house PCB design
ERCO develops and populates its PCBs in-house. Strict testing to the highest standards of quality and efficiency means exceptionally low failure rates.

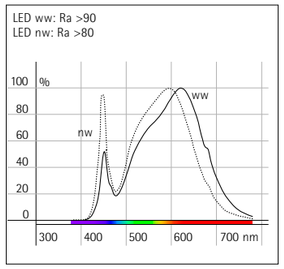


High lumen maintenance with High-power LEDs
Up to 50,000 operating hours, at least 90% of all High-power LEDs used by ERCO emit more than 90% of their initial luminous flux. During this time a maximum of 10% of LEDs are permitted to fall below this (L90/B10). These LEDs have an L90 specification for 100,000 operating hours.





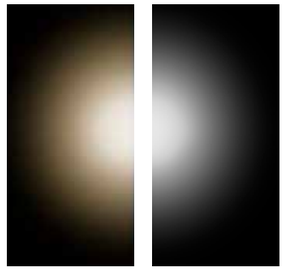
Precise colour consistency
ERCO modules with High-power and Mid-power LEDs correspond to an SDCM (Standard Deviation of Colour Matching) of ≤1.5 and therefore ensure outstanding colour matching.



Optimum colour rendering
ERCO attaches great importance to very good colour rendering. This ensures a natural, consistent rendering of colours across the service life. Other spectra are available on request: www.erco.com/individual

Reducing the damage factor with LEDs
The spectra of High-power LEDs have a low damage factor and are therefore ideal for museums.

Light source	Relative damage factor f (mW/lm)
LED 2700K, CRI 92	0.151
LED 3000K, CRI 92	0.165
LED 3000K, CRI 95	0.160
LED 3500K, CRI 92	0.170
LED 4000K, CRI 82	0.190
LED 4000K, CRI 92	0.198



Different light colours
There is an ideal light colour and colour rendering for every application. For this reason ERCO offers a wide variety of spectra. LEDs with neutral white light colour generally have a higher luminous efficacy than warm white LEDs.

Tunable white
In ERCO luminaires with tunable white LED modules, the light colour can be infinitely adjusted. This enables the light atmosphere in the room to be adapted to daylight or personal moods.

LED modules: light colours and LED types

Work
Focussed work and constructive meetings require an attentive spirit. Neutral white light colours have an energising effect and support us in everyday challenges.

- ☐ 4000K CRI 82
- ☐ 4000K CRI 92

Culture
We are enthralled by art and cultural treasures. For effective presentations we recommend warm to neutral white light colours. High colour rendition provides a genuine art experience.

- ☐ 3000K CRI 92
- ☐ 3000K CRI 95
- ☐ 3500K CRI 92
- ☐ 4000K CRI 92

Shop
Showcasing goods is important, especially where we make emotional decisions. Warm white light colours are suitable for materials with warm tones. Neutral white light brings out the best in technical products.

- ☐ 3000K CRI 92
- ☐ 3500K CRI 92
- ☐ 4000K CRI 92
- ☐ Fashion

Community
Good orientation and an inviting atmosphere are in the foreground when we enter public buildings. Warm to neutral light colours create a clear overview.

- ☐ 3000K CRI 82
- ☐ 3000K CRI 92
- ☐ 4000K CRI 82

Overview of LED types and light colours

	High-power LED	Mid-power LED	Chip-on-Board LED
Luminous efficacy max.	138lm/W	156lm/W	149lm/W
Lumen maintenance	L90/B10 for 50,000 h	L80/B50 for 50,000 h	L80/B50 for 50,000 h
Light colours	☐ 2700K CRI 92 ☐ 3000K CRI 92 ☐ 3000K CRI 95 ☐ 3500K CRI 92 ☐ 4000K CRI 82 ☐ 4000K CRI 92	☐ 2700K CRI 92 ☐ 3000K CRI 82 ☐ 3000K CRI 92 ☐ 3500K CRI 92 ☐ 4000K CRI 82 ☐ 4000K CRI 92	☐ 2700K CRI 82 ☐ 2700K CRI 92 ☐ 3000K CRI 82 ☐ 3000K CRI 92 ☐ 3500K CRI 92 ☐ 4000K CRI 82 ☐ 4000K CRI 92 ☐ 3000K CRI 92 Fashion

Contemplation
Sacred buildings are unique. The choice of light colour therefore depends on the respective architecture and the required scenographic effect.

- ☐ 3000K CRI 92
- ☐ 3500K CRI 92
- ☐ 4000K CRI 92

Living
Our own four walls stand for cosiness and wellbeing. Warm white colours support this.

- ☐ 2700K CRI 92
- ☐ 3000K CRI 92
- ☐ 3500K CRI 92

Public
In public places we want to feel safe and receive good orientation. Warm to neutral white light colours fulfil this task.

- ☐ 3000K CRI 92
- ☐ 4000K CRI 82

Hospitality
In places where we meet socially and where it needs to be comfortable, we recommend warm white light colours with high colour rendition.

- ☐ 2700K CRI 92
- ☐ 3000K CRI 92
- ☐ 3500K CRI 92

Luminaires with High-power LEDs
Luminaires with High-power LEDs, for instance spotlights, downlights and projectors, excel through their lighting precision, differentiated light distributions and longevity.

Typical applications are:

- Culture
- Community
- Contemplation
- Public

Luminaires with Mid-power LEDs
Thanks to their low luminance, Mid-power LEDs enable luminaires with large lens apertures. They are efficient, provide high visual comfort and fulfil all requirements for workplace lighting in conformance with standards. Such downlights, downlights for tracks and pendant luminaires are therefore particularly suitable for:

- Work
- Community

Luminaires with COB LED
Luminaires with COB LED technology provide great creative scope for designers in choosing the right spectrum, for example for the presentation of a variety of goods or the atmospheric design of a room. Spotlights and recessed spotlights with Chip-on-Board LEDs are therefore ideal for:

- Shop
- Living
- Hospitality

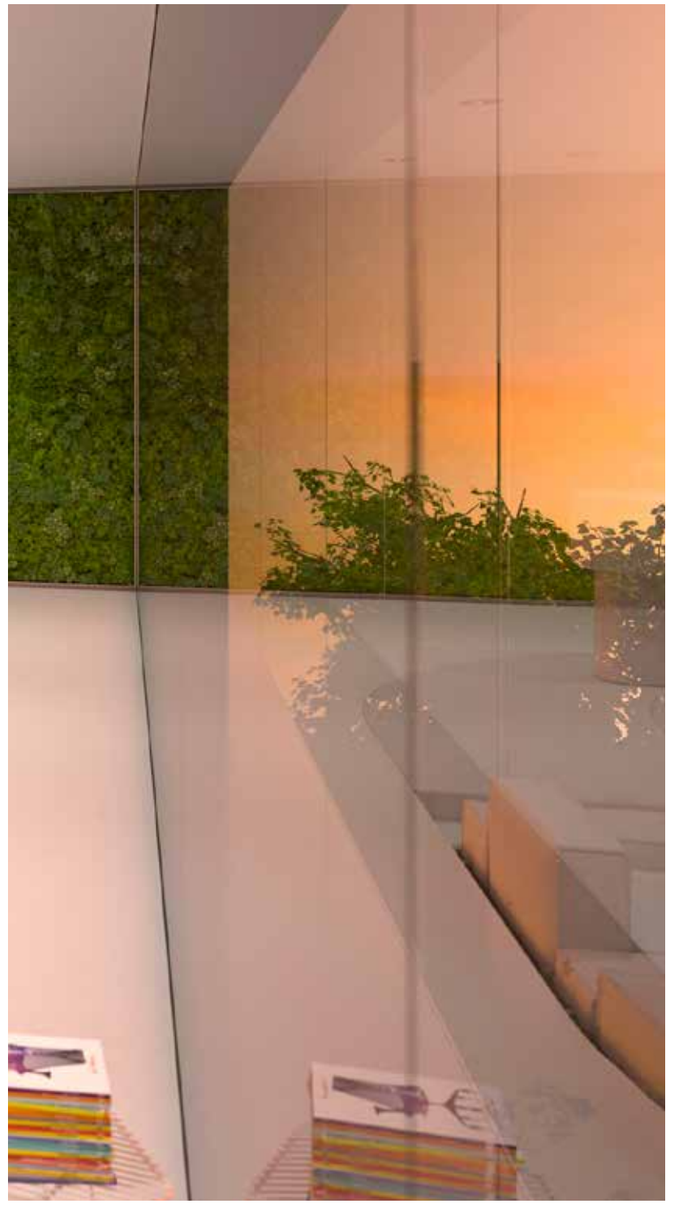
Precise colour consistency
ERCO LED modules with High-power and Mid-power LEDs show very good colour consistency and achieve the outstanding typical initial value of SDCM ≤1.5.

If you can't find your required spectrum here, you are welcome to contact us:

www.erco.com/individual

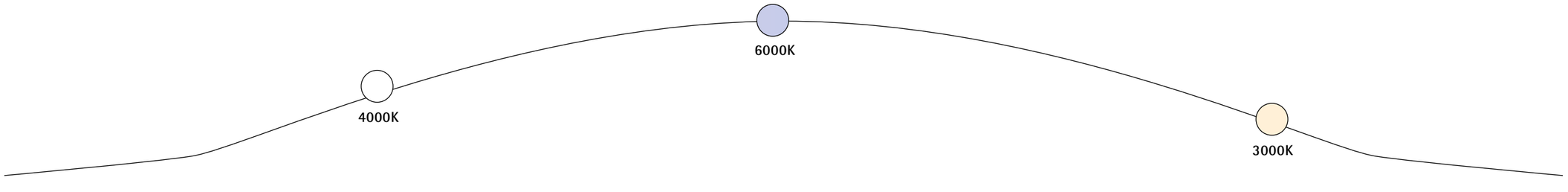
Tunable white: Human Centric Lighting

Dynamics to support Human Centric Lighting
Tunable white technology enables lighting designers to elegantly change from warm to cooler light colours. Especially in rooms with long periods of occupancy, the tunable white function increases the quality of stay. Changes in brightness and colour temperature are typical characteristics of daylight. This atmosphere can be transferred to interiors via lighting control and tunable white technology. Cool light colours in the morning and at noon have an activating effect, whereas warm-toned light in the evening contributes to relaxation. For a pleasant lighting atmosphere in offices, the hospitality sector and living areas, ERCO offers recessed luminaires with the tunable white spectrum in addition to pendant luminaires with tunable white uplight. Tunable white technology is particularly beneficial for workstations, as control of the lighting according to needs enhances well-being and increases employee productivity. Due to its long tradition of focusing on perceptual lighting, ERCO has already developed extensive solutions that integrate the factor of Human Centric Lighting. This includes, for example, the concept of efficient visual comfort, lighting tools for vertical illumination and the planning of various light scenes to create attractive atmospheres with light.



Tunable white
Recessed luminaires and pendant luminaires with tunable white technology are available for general lighting with various colour temperatures.

Human Centric Lighting
By modifying the brightness and colour temperature, the properties of daylight can be applied to interior spaces. This enables, for example, a warm-toned light for morning and evening as well as a cooler colour temperature at noon. Thus the colour in the interior simulates the course of daylight outdoors.



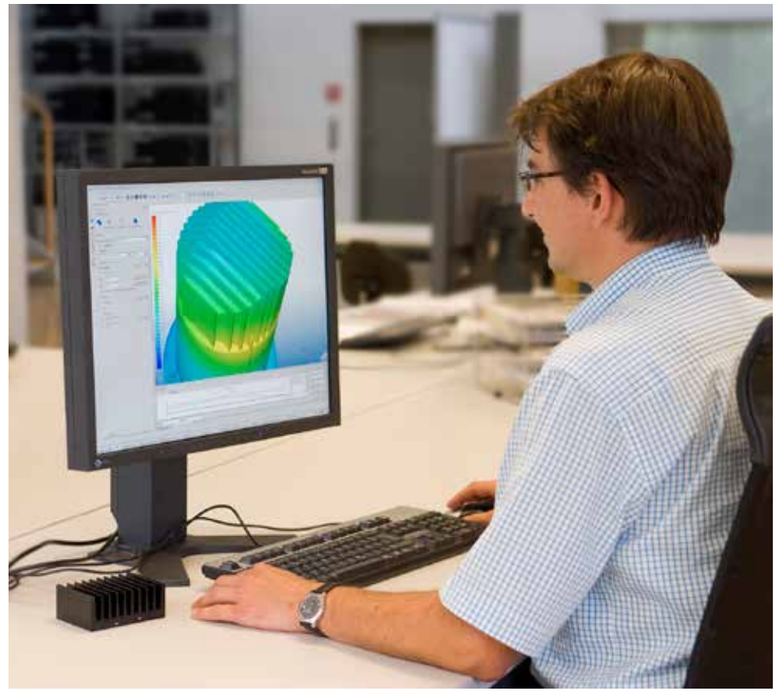
Control gear and thermal management

For quality purposes, ERCO primarily uses its own control gear for DALI and phase dimmable luminaires. In turn, this means that proprietary ERCO luminaires and driver systems outperform all other alternatives in the field, with optimised, consistent dimming characteristics across the ERCO range, making the solutions ideal for filming in LED light. The control gear is precisely matched to the relevant LED module, offering a tested and effectively sealed unit for low-maintenance operation.

Tested safety
ERCO luminaires are always provided with matched, pre-connected control gear, offering a tested and effectively sealed unit.

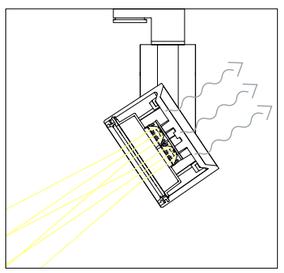
Flicker-free light
LEDs that are dimmed using pulse width modulation (PWM) in filming can produce unwanted image artefacts in the form of spurious lines. This is explained by the longer on/off cycles of the LED that reduce its brightness. For flicker-free light, ERCO DALI control gear uses the constant current dimming method (CCR), which varies the power to the LED. Phase dimmable ERCO control gear deploys a combination of both methods, changing from constant current dimming used across the main dimming range to PWM from 15% downwards. The small PWM range means less interruption of the current flow, thereby reducing the dimming level suitable for filming still further.

LEDs produce heat to generate light. Unlike conventional lamps, however, the heat is not emitted as infrared light, but dissipated via the LED module and the luminaire housing. Good thermal management therefore is indispensable for the efficiency of the LEDs as well as the integrated control gear in luminaires such as spotlights. With this in mind, ERCO's holistic development approach combines photometric, electrical, mechanical and thermally efficient components in a single system. This unit is tested in simulations and measurements as part of the design process to ensure optimised thermal management of each luminaire in the field, achieving the enhanced levels of luminous efficacy and lumen maintenance measured in the laboratory.

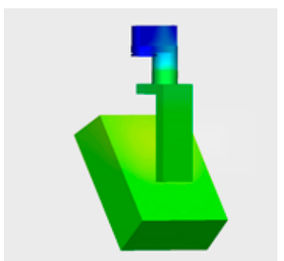


Thermal simulations
Beginning with the development phase of LED luminaires, the ERCO engineers produce thermal simulations to optimise the thermal management. Tests in the measurement laboratory take place to confirm the accuracy of the detailed simulations and guarantee excellent light output when the finished product is in use.

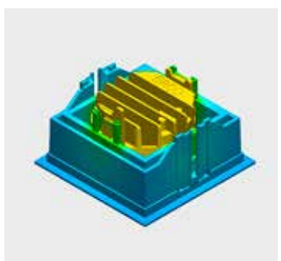
Thermal interfaces
A stable bonding between the LED module and housing creates ideal conditions for dissipating heat. Integrated solutions offer an advantage over other solutions for retrofitting or cooling via fans.



Thermal radiation from LED luminaires
With LEDs, heat is generated by the current flow. This is then discharged to the rear via the circuit board. The light on the other hand is largely free of infrared radiation. This is important, especially in museums, for conservation reasons.



Heat dissipation through the housing
With spotlights, the heat can be efficiently dissipated away from the LED module via the housing. The cast-aluminium material gives the luminaire good thermal conductivity and a high thermal capacity.



Heat dissipation via cooling fins
The correct design of cooling fins ensures that the recessed luminaires have an ideal thermal balance. The position, length and thickness of the cooling ribs are subjected to thermal simulations during the design process.

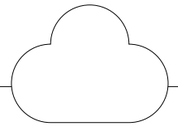
Control of light via radio technology: Casambi Bluetooth

Bluetooth-enabled luminaires from ERCO
Individually switching and dimming luminaires, setting up light scenes and integrating sensors – all made possible by the new, wireless method of control now offered by ERCO in the form of Bluetooth-capable luminaires. Only a smartphone or tablet with the Casambi app are needed for setup and operation, intuitively and simply making available a level of design flexibility and convenience functions that in the past required complex light control systems.

Mesh network
Luminaires form a so-called "mesh network" and are both transmitter and receiver. This means the network can also function in winding or angled rooms and over long distances. Such mesh networks can be independently set up in any numbers and linked with applications on the internet via gateways.

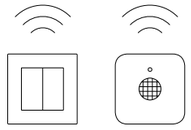
Gallery function
The gallery function enables individual luminaires or luminaire groups to be controlled via a self-photographed image of the room. This transforms the photo into an intuitive user interface.

Radio standard – integrated in the control gear
ERCO integrates Bluetooth technology from the Finnish company of Casambi directly into its control gear developed and produced in-house. The luminaires equipped in this way communicate with each other as well as with compatible smartphones, tablets and Smartwatches via the Bluetooth LE radio standard, with luminaires then being controlled over the Casambi app on the mobile end device.



Cloud technology
Via the Casambi Cloud, network settings are backed up and synchronised across all devices. This enables high flexibility and security - even if mobile devices change or fail.

Integrating further operating elements
In addition to smartphones, tablets and smartwatches, the integration of Bluetooth-capable wall switches, push-buttons and sensors labelled "Casambi ready" is possible.



ERCO offers extensive luminaires with Casambi. Thanks to our "ERCO individual" service, Bluetooth-capable variants of further luminaires can be requested for specific projects.

Versatile functions
The range of functions on the free Casambi app includes switching and dimming single luminaires, grouping luminaires and setting up light scenes. Intuitive operation is provided by a visual user interface from ERCO with a simple, clear design.

Available on the App Store

ANDROID APP ON Google Play

Luminaire system

The potential to organise and structure space, enhance architecture or model objects with light is virtually unlimited. ERCO develops lighting tools to produce and guide light efficiently and precisely in any spatial situation and dimension. ERCO LED luminaires for indoor and outdoor areas are fully integrated into the systematic structure of the overall ERCO range.

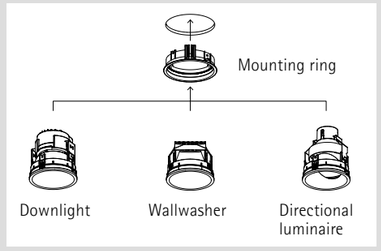
Whereas the distinct functional design of the lighting tools, specially developed by ERCO's design team to reflect the requirements of LED technology, is the most prominent aspect of the system, its heart is designed around different – and, for spotlights, exchangeable – light distributions, a wide variety of lumen categories as well as identical light colours. For easy commissioning and operation, the lighting tools additionally offer a huge range of tested mounting options, with defined control interfaces and uniform terminology. This allows the designer to combine ERCO LED luminaires as required to solve even complex lighting tasks without compromising on light quality and flexibility.

Luminaire ranges
Whether it be for precise accentuation or the wash-lighting of a huge façade – the uniform product design, consistent light distribution options and identical light quality, with a diversity of sizes and lumen packages, enable the designer to select the luminaire best suited for the project.

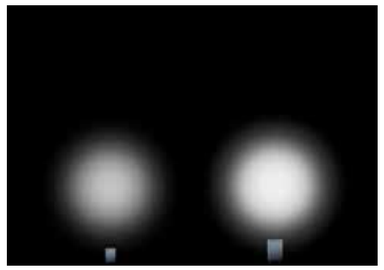
Modular product design
Whether recessed luminaire, surface-mounted version or free-standing model – ERCO designs and develops luminaires with the objective of providing ranges with cross-category features. This approach enables the designer to define complete, integrated lighting concepts for related areas and to respond individually to specific architectural features without the need to specify a different technology or light distribution and without compromising on the design.

Easy and reliable handling extends to digital lighting tools
The ERCO system design is convincing not only from a design point of view, but also from a technical perspective. For optimised efficiency, existing installations with conventional lamps on ERCO track can be supplemented quickly and easily with LED spotlights, or replaced altogether, whilst the design of the LED spotlights can also be combined with conventional spotlights. Accessories such as the uniform mounting rings of the Quintessence range of recessed luminaires provide additional flexibility. Upgrades to more efficient LED technology or just small changes to the photometric distributions are simple matters due to the modular system.

Spotlights and track
Innovative LED spotlights can be simply installed into existing ERCO track installations.



Quintessence
The modular system of Quintessence is based on uniform mounting rings and mounting frames. This enables luminaires with different characteristics to be installed. Subsequent modifications such as replacing a low-voltage halogen downlight with an LED directional luminaire do not present any difficulty with Quintessence.



Lumen categories
The LED luminaires in the ERCO product range cover a wide variety of lumen categories and therefore offer an appropriate solution for a large number of lighting tasks. Numerous product families are also available with two luminous flux variants for each construction size to match the luminaire to the desired brightness.

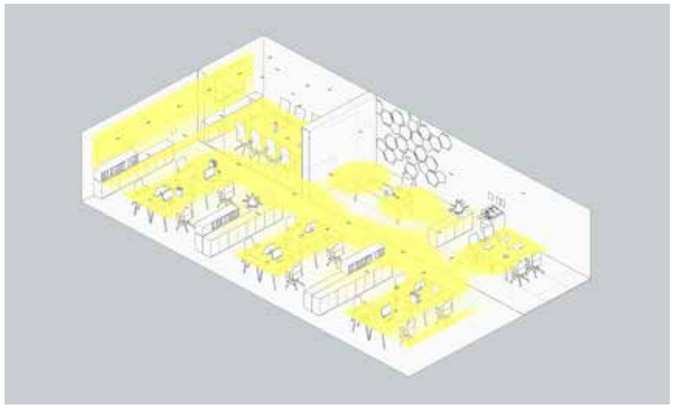
Light distribution options
The light distributions of LED luminaires range from narrow accentuation to wallwashing and wide beam distributions for floodlighting and general lighting. Interchangeable Spherolit lenses also provide additional flexibility with spotlights.

Light distributions for track:

- Narrow spot <10°
- Spot 10°– 20°
- Flood 25°– 35°
- Wide flood >45°
- Extra wide flood >80°
- Oval flood approx. 20° x 60°
- Wallwash

Case study
Office lighting: qualitative instead of quantitative lighting

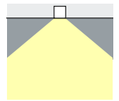
Stringent specifications and traditional design approaches with only uniform general lighting without perception hierarchies, lead to unsatisfactory lighting solutions in offices. Neglecting the specific use and a bland overall impression are typical disadvantages. In contrast to such lighting concepts based on quantitative factors, perception-orientated design aims to divide the space into zones for individual needs. LED recessed luminaires with various light distributions can be positioned at specific points and achieve efficient lighting with high visual comfort due to differentiated light distributions. This approach creates lighting solutions matched to the specific visual task and spatial effect. Furthermore, illuminated vertical surfaces not only increase perceived brightness but also improve spatial perception. Using efficient lighting tools and placing importance on intelligent luminaire arrangements, creates economic lighting solutions orientated to current standards and user requirements.



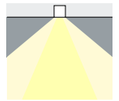
Qualitative lighting design for offices

Zonal lighting analyses where the user needs light – lumi-naires with good glare control and simultaneously high cylindrical illuminances illuminate the workplace, enable good visual comfort and achieve good facial illumination. Illuminated vertical surfaces ensure a bright spatial impression and balanced contrast conditions for work on screens. Illumination of the circulation area in the central aisle also allows pleasant orientation.

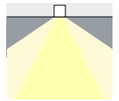
LED recessed luminaire



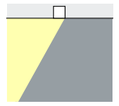
LED downlight
Wide flood



LED downlight
Oval flood



LED downlight
Oval wide flood



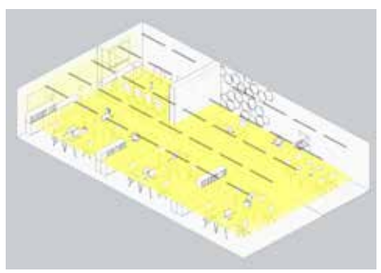
LED lens wallwasher

Key figures
With nominal illuminance of at least 500lx in the workstation area:

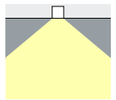
No. of luminaires	32
Connected load (W)	622
Wattage per area (W/m²)	3.93

Conventional lighting design for offices

A matrix solution with panel lights does not take into account the visual task of the user. Energy needs for sufficient lighting also increase and the low-contrast impression in the space appears undefined and uninteresting.



LED recessed luminaire

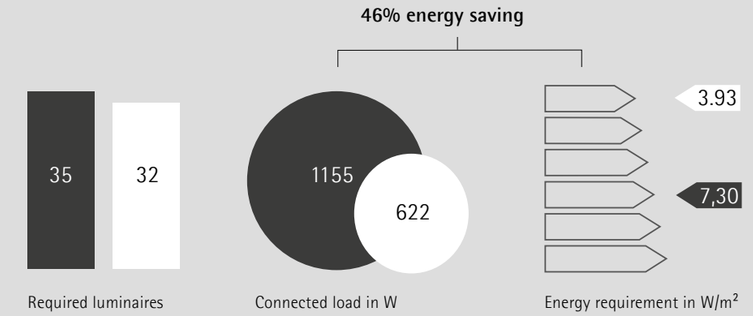


Key figures
With nominal illuminance of at least 500lx in the workstation area:

No. of luminaires	35
Connected load (W)	1155
Wattage per area (W/m²)	7.30

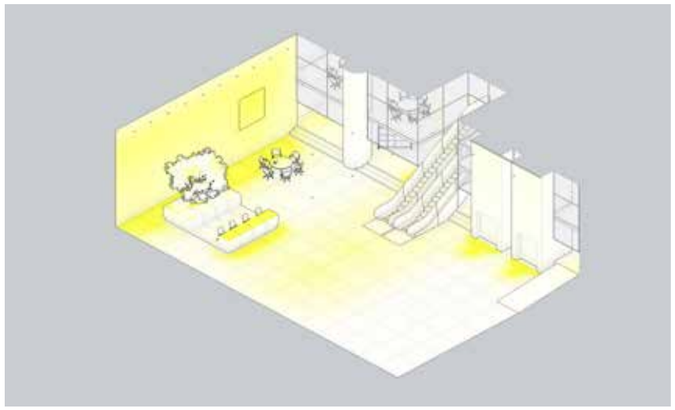
Summary

The effectiveness of low-maintenance lighting with LEDs can be increased with zonal lighting design. Energy requirements can also be reduced with perception-orientated lighting concepts. Simultaneously, improved visual comfort and a more appealing spatial impression are created.



Case study
Community: efficient visual comfort

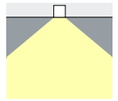
The foyer of an authority, university or concert hall serves as the business card of the specific institute. Often designed as a generously dimensioned, high entrance space, foyers serve representative purposes and at the same time function as reception and waiting areas as well as providing access to adjacent parts of the building. Striking designs also have an identity-supporting element for visitors and users. This multiplicity of functions requires a nuanced lighting concept that can be economically implemented and operated. Qualitative lighting design approaches make use of the principles of perception psychology to efficiently divide the room into zones. One possibility of creating orientation in large, high rooms is to establish graduated depth in the room: the foreground and background are differentiated by the use of appropriate contrasts in brightness. The specific illumination of elements such as stairs, reception desks and waiting areas structures the space and guides the view of the user. Wallwashing increases the impression of brightness in the room: particularly in public buildings with transparent facades, wallwashing during the day offers an analogy to areas near the facade flooded with daylight, and at night-time establishes a visual reference from the outside to within. Lighting solutions offering high visual comfort via good glare protection allow the eye to adapt, and therefore fulfil their tasks with lower levels of illuminance.

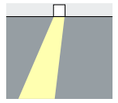


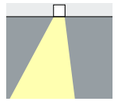
Qualitative lighting design for foyers

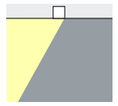
Rapid orientation and a bright spatial impression: perception-oriented lighting divides the room into zones of light. Recessed luminaires with various light distributions enable specific room geometries and user profiles to be responded to.


LED recessed luminaire


LED downlight
Wide flood


LED recessed spotlight
Spot


LED recessed spotlight
Flood

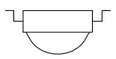

LED lens wallwasher

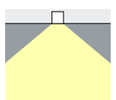
Key figures
With a mean illuminance of at least 300lx at the counter and minimum of 100lx in circulation areas:

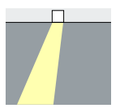
No. of luminaires	27
Connected load (W)	822
Wattage per area (W/m²)	1.63

Quantitative lighting design for foyers

Monotonous lighting that does not take the spatial context into account ignores the perception hierarchies offered by the architecture and makes orientation more difficult for users. It also requires more energy to generate a comparable impression of brightness.


LED recessed luminaire

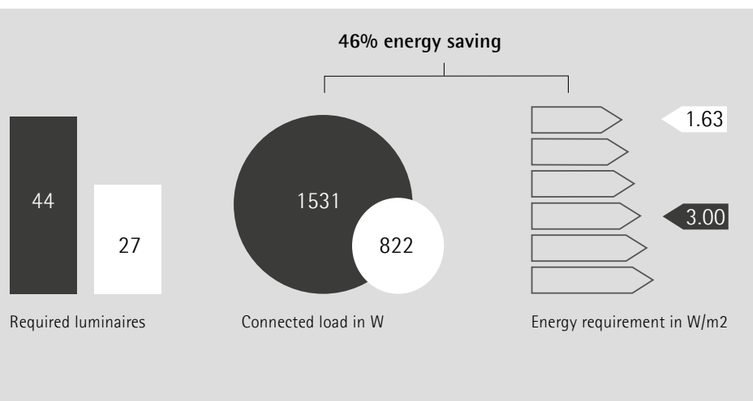

LED downlight


LED recessed spotlight
Spot

Key figures
With a mean illuminance of at least 300lx at the desk and minimum of 100lx in circulation areas:

No. of luminaires	44
Connected load (W)	1531
Wattage per area (W/m²)	3.00

Summary
Qualitative lighting design structures high rooms into functional zones to facilitate orientation. Energy-efficient ERCO LED luminaires, thanks to their specific light distributions, enable wide luminaire spacing and therefore economic lighting.



ERCO individual
Lighting tools to suit your requirements

We offer you extensive options for individualising standard products in the form of "ERCO individual", as well as providing support for the development of sophisticated special luminaires. Our service for your project includes:

- decades of experience in developing special luminaires
- local contact persons
- qualified consultation
- solution-oriented approaches
- application-oriented prototyping
- reliable planning documents
- series-quality special luminaires

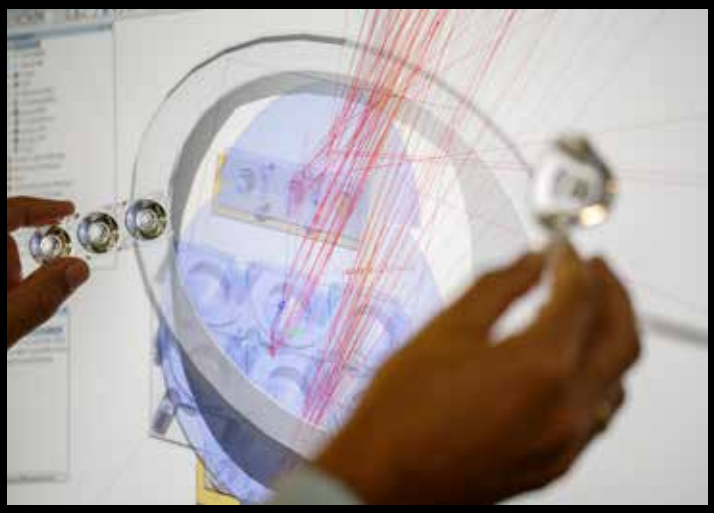
- ✓ Additional spectra and light colours, such as 2700K CRI 92, 3000K CRI 95, 3500K CRI 92 or 4000K CRI 92
- ✓ Alternative LEDs, for instance Chip-on-Board LEDs with own-developed photometrics
- ✓ More than 10,000 additional housing colours in RAL and NCS colour systems as well as the individual measurement of colour samples

- ✓ Individual mounting solutions, for example other track adapters or individual clamps and holders
- ✓ Plug systems pre-assembled for quick wiring, for example with Wieland or Wago connections
- ✓ Extended control possibilities, for example Bluetooth via Casambi, Lutron or DMX

Do you have any further requirements?
Simply contact us!

www.erco.com/individual

Light is the fourth dimension of architecture



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