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# BRING NATURE INSIDE

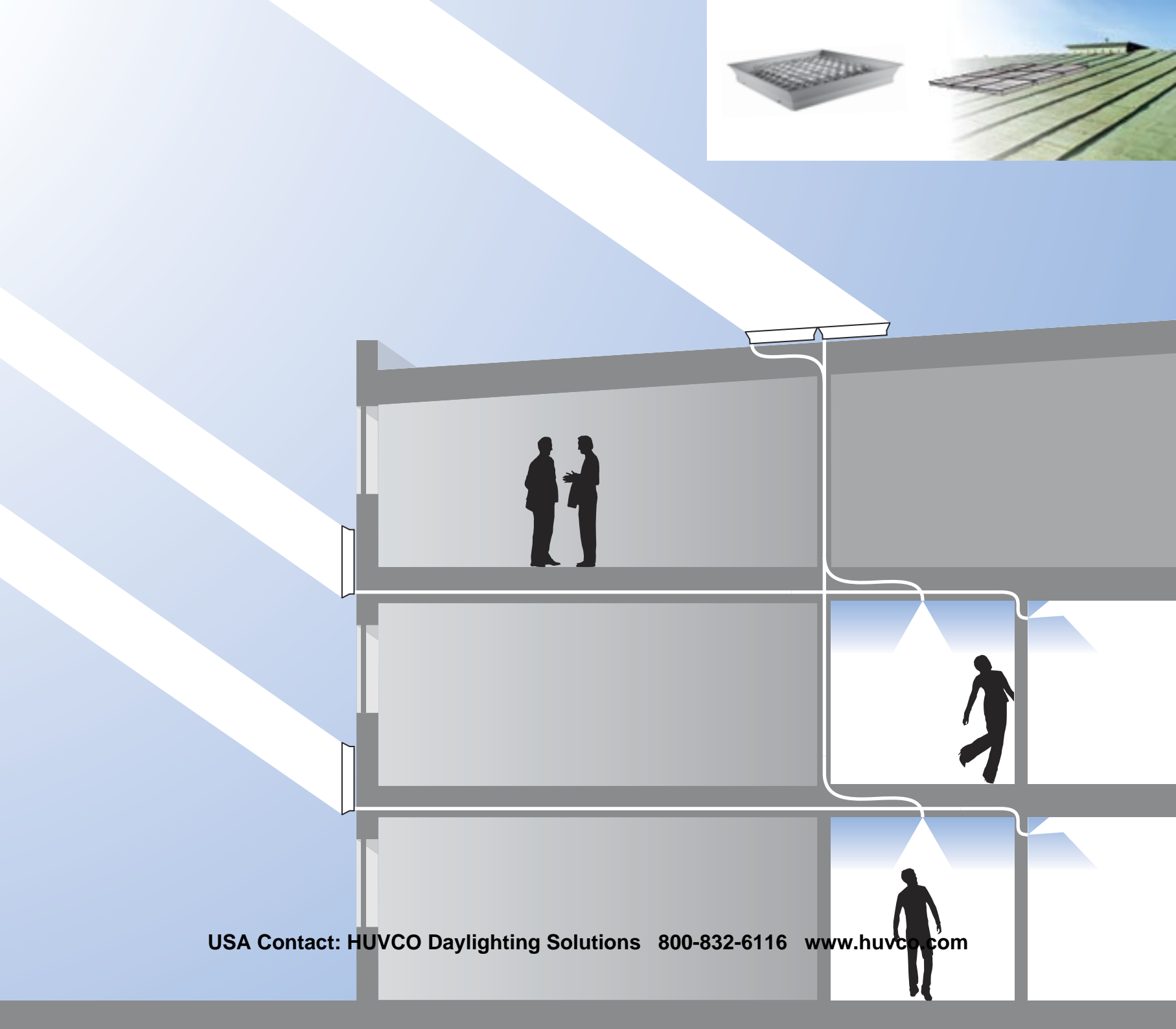
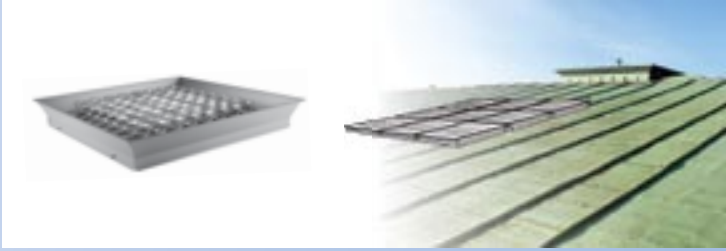
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*Sunlight has the highest light quality available – now Parans lets you use it for real. The Parans System collects sunlight outdoors and brings it indoors using fiber optic cables. This way you can experience the presence of nature in rooms where you work, live, love and learn...*

*Welcome to Parans!*

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# The Parans System

*Imagine an indoor environment where the variation of outdoor light is always present - a house that has sunlight in every room. With this brochure, Parans has the pleasure of introducing the second generation of the revolutionizing Parans System.*

## **The Principle**

In the sketch to the left, the simple principle of the Parans System is shown. First, sunlight is collected by Parans Solar Panels outdoors. The sunlight is then brought into the building through the Parans Optical Cables. Indoors, the sunlight flows out through Parans Luminaires. This technology is called Fiber Optic Solar Lighting.

## **Parans Solar Panel**

The Parans Solar Panel can be mounted on roofs or facades and employs an array of optical lenses to collect and concentrate incoming sunlight. It is easily installed and integrates with buildings' surfaces to allow for architectural integrity.

## **Parans Optical Cable**

The Parans Optical Cable is made of several fiber optic strands. The cable is thin and flexible. Thanks to the high light transmission, sunlight can efficiently reach many locations far into buildings.

## **Parans Luminaires**

In the chosen rooms, the sunlight is emitted through a Parans Luminaire, specifically designed to recreate the feeling of sunlight. A line of luminaires is available to match the outline, purpose and aesthetic of the specific room that is illuminated with the healthy sunlight.

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*Illuminating interiors with sunlight from the Parans System gains many benefits. They range from increased alertness to reduced global warming. We would like to give you some examples here.*

## Wellness & Productivity

- Productivity increases by 6 – 16 percent when natural light is added to a workplace.<sup>1</sup>
- 1 percent productivity increase equals the total energy cost in offices.<sup>2</sup>
- Pure sunlight is dynamic and has a full spectrum that triggers the ganglion cells, which controls levels of melatonin and cortisol, thereby synchronizing the body clock.
- Sunlight gives improved visibility from improved light, better color rendering, and the absence of flickering from electrical lighting.<sup>3</sup>

## Sustainability & Energy Savings

- Electrical lighting represents 40 – 50 percent of the energy consumption in commercial buildings.<sup>4</sup>
- Electrical lighting contributes 25 – 30 percent of the emission of greenhouse gases generated in commercial buildings.<sup>5</sup>
- Exchanging half of a building's electrical lighting for Parans Fiber Optic Solar Lighting can lower the energy costs by 20 – 25 percent and the emission of greenhouse gases by 10 – 15 percent.



## Increased Property Value

- Larger parts of buildings can be used commercially as Parans brings the valuable sunlight to rooms that lack of natural light and thereby transforming areas which are commercially unviable.
- The property income per each rented square meter can be significantly increased as spaces are enhanced with sunlight. Wellness and Productivity are economical realities for all tenants.
- The Parans System offers an advantage when attracting customers that desire a sustainable facilities solution. Especially as a Green corporate profile is more or less a necessity for modern companies and societies.

## Retail Sales

- A study of 108 nearly identical stores showed 40 percent higher retail sales in stores with natural light compared to those without, by 99 percent statistical certainty.<sup>6</sup>
- Shoppers stay longer and feel more at ease in a store with natural light. Increased customer loyalty as a result.
- Staff experiences increased efficiency and health, decreasing absence and sick leave.

# Applications

*In any building where a comfortable and healthy indoor environment or energy efficiency plays a role, the Parans System offers a valuable contribution. Using the Parans System adds distinct advantages in the following areas.*

## **Office and Education**

Wherever people are involved in intellectual work or learning, it's crucial to provide a supportive environment that keeps the brain relaxed, the mind alert and the body healthy. Research proves that natural light does just that. In a 1999 study, students in the classrooms with most natural light progressed 20 percent faster on math tests and 26 percent faster on reading tests. Workforce studies show how productivity increases by typically 6-16 percent, absence decreases by around 5-25 percent. Add to this the energy savings of up to 25 percent of the annual costs and it's not difficult to calculate a short time between investment and payback.

## **Healthcare**

It is important to provide a healing and positive atmosphere in hospitals or other healthcare facilities. Therefore, creating a living and healthy lighting that brings elements of nature indoors is a sound investment. Hospitals are such large structures that many occupied areas can be left without natural light. A problem that the Parans System is capable of solving.

## **Galleries and Museums**

At last art galleries and museums can show paintings and sculptures in the natural light it was created in! This is possible since the Parans System does not transfer the harmful ultraviolet radiation of the sunlight into buildings, which can degrade artwork and textiles. It only transfers visible light. The heat-intensive infrared radiation that requires energy-consuming cooling is also filtered away.

## **Retail Stores**

Crucial to the success of any retail store is to attract customers and to make them stay and shop. It is therefore no wonder that sales can increase by 40 percent as shoppers stay longer in environments made more comfortable and interesting by adding natural light. In addition, the uniqueness and brightness of the Parans System is sure to attract a great deal of attention to any venue.

## **Residential**

Our home is where we spend time without obligations, a place for safe and relaxed living. Many homes have rooms that could be so much more inviting and comfortable if they were reached by the living sunlight. With the Parans System, many more rooms - deep inside buildings, north facing or even under ground - can be illuminated with real sunlight.





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Luminaires: Parans L1 Medium, Location: Parans Showroom



# Product Line Overview

With this overview you can easily see how many Parans Luminares that can be used with each Parans Solar Panel. Four optical cables come from each Parans SP2.

## Parans Solar Panel



Parans SP2

## Parans Optical Cable



Parans OC

## Parans Luminares



Parans L1



Parans L2



Parans L3



Parans L4



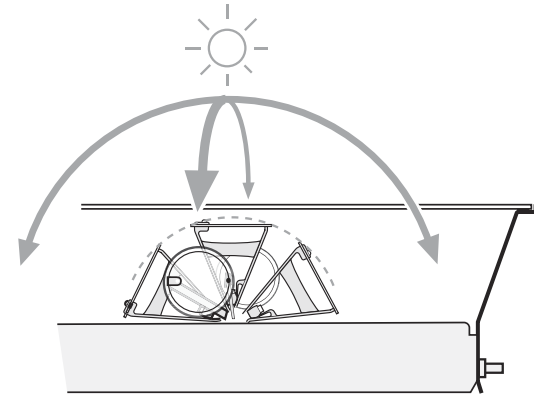
Parans L5

	Parans L1	Parans L2	Parans L3	Parans L4	Parans L5
Model	S / M / L	S / L	---	---	---
Light Source	Pure Sunlight	Hybrid	Pure Sunlight	Hybrid	Hybrid
Number of Optical Cables	1 / 2 / 4	1 / 4	1	1	1
Luminaires per Solar Panel	4 / 2 / 1	4 / 1	4	4	4
	4 x	4 x	4 x •	4 x	4 x
	2 x	1 x			
	1 x				

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## Parans Solar Panel

*It is with pride that we present the second generation of the Parans Solar Panels, the Parans SP2. This is an upgraded version of the key innovation which makes the Parans System possible. On roofs or facades, it collects incoming sunlight and channels it into the Parans Optical Cable that makes the flexible transport of sunlight into buildings possible.*



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## About the Technology

The Parans Solar Panels are 1 m<sup>2</sup> modules that are mounted fixed on roofs or facades. Inside the panel, 62 Fresnel lenses move uniformly around their axis, tracking and concentrating sunlight. This concentration of sunlight is Parans' solution to bringing sunlight so far into buildings in such an easy and flexible way. The technology is patented.

## Tracking the Sun

The Parans SP2 employs active tracking, guiding the Fresnel lenses so that they are always orientated towards the sun. This movement is achieved with three motors, consuming on average under 2 W. Thanks to the active tracking, the Parans SP2 can be installed or moved to any location and orientation without pre-programming. On a technical level, the tracking is controlled by a photosensor that continually feeds the internal microcomputer with light level data. At installation, the SP2 immediately scans the sky to detect the direction to the sun. It then learns and remembers the solar path so that it always is ready to collect sunlight.

## Concentrating Sunlight

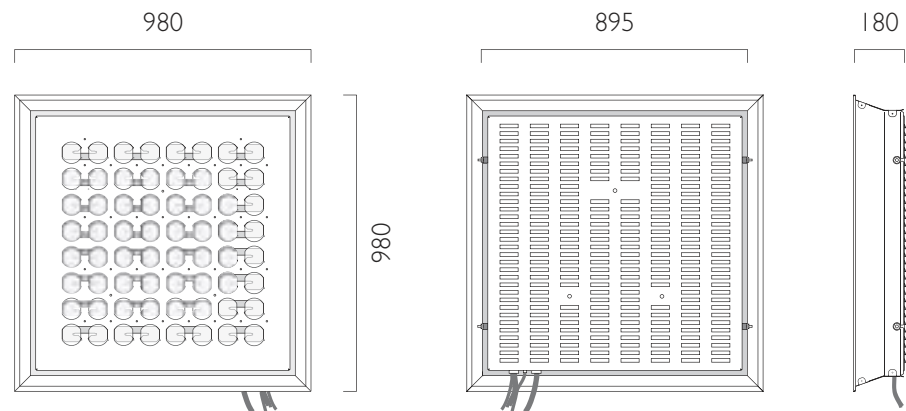
The tracking keeps the surface of the Fresnel lenses perpendicular to the direction of the incoming sunlight throughout the day. The configuration ensures that the sunlight is efficiently concentrated into 0,75 mm optical fibers placed underneath each lens.

## Performance

The new Parans SP2 has the capacity of collecting sunlight over large angles as well as delivering high luminous flux. The SP 2 can collect sunlight with an incident angle of 60 degrees from the direction to the sun, thus forming a 120 degrees active cone. This represents on average 8 hours of sunlight.

## Specifications

Dimensions	980 x 980 x 180 mm
Weight	30 kg
Number of Fresnel Lenses	62
Fiber Optic Cable Quantity	4
Power Supply	AC 220-250V
Mean Power Consumption	2 W
Shell Material	Eloxated Aluminium
Glass Surface	Tempered Glass



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## Mounting

The Parans SP2 can be installed on both roofs and facades thanks to the large active cone of 120 degrees. The panels are mounted fixed with standard building elements. In general, the optimal azimuth (compass direction) of the panel is facing south if north of the equator and vice versa.

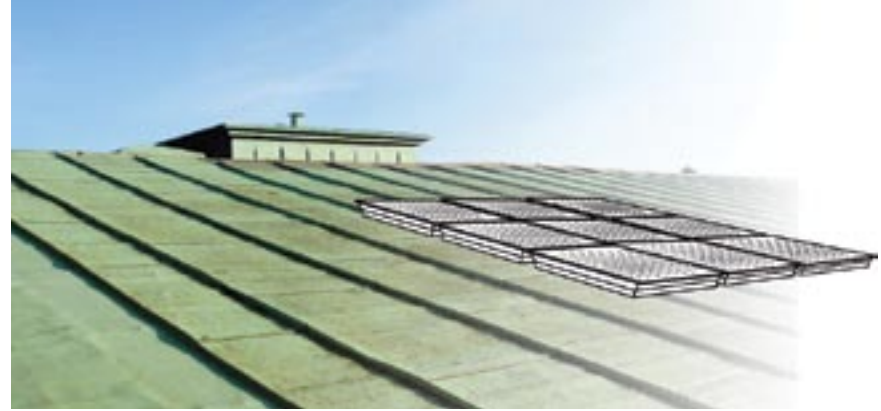
## Roof Mounting

Depending on how much the roof angle deviates from the optimal orientation in both azimuth and elevation, the panel can either be mounted flat on the roof or with a tilt.

## Facade Mounting

On all latitudes, the panel can be mounted flat on facades with sunlight throughout the year for facades facing east or west. For southern facades, the panel can be mounted flat on the facade on latitudes from 90 to 53 degrees (North of for example Berlin) the panel can be mounted flat on facades with sunlight throughout the year.

Contact Parans for information regarding mounting, orientation and solar hours for your specific project!



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# Parans Optical Cable

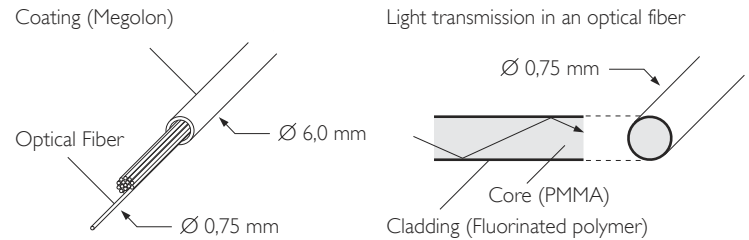
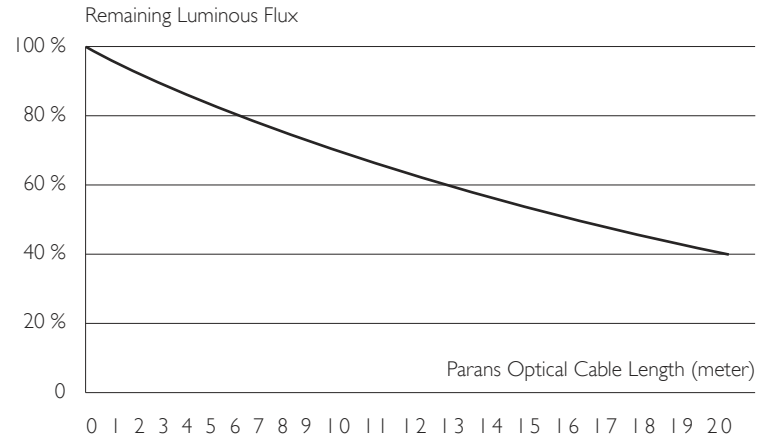
The fiber optics that leads the light in the Parans Optical Cable has high light transmission and flexibility. These are the main reasons why the Parans System makes it possible to bring sunlight so far into buildings without occupying valuable building space.

## Specifications

From each Parans Solar Panel come four optical cables. These are 6 mm in diameter, a density of 30 g/m and can be ordered up to 20 m long. The bending radius can be as small as 50 mm, making light work of tight corners.

The optical cables are sheathed with fire retardant Megolon. Within the cable, the light is transported in 16 of the 0,75 mm High Performance Plastic Optical Fiber made of PMMA (PolyMethylMethAcrylate). The light transmission is 95,6 percent per meter. This gives for example that 64 % of the light remains after being transported 10 meters in the optical cable, see graph to the right.

Light Transmission in Parans Optical Cable



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# Parans Luminaires

*The experience of sunlight in a room is exclusively different from that of artificial light. The sunlight has a continuous color spectrum that makes it healthy. It is also living and dynamic, following the conditions of the outdoor light. Yet it is calm in its character and does not suffer from the hardly noticeable, but brain disturbing flickering of electrical light. Parans Luminaires to bring out the positive properties of sunlight and to fulfill the potential of every room.*

## Designs for Sunnier Days

Parans has a dedication to bringing sunlight inside. A team of lighting specialists and architects collaborate to create Parans Luminaires that make the most of the valuable sunlight. Consideration must be taken to the design of the luminaires themselves so that these are light and representative for the transparency that the Parans System brings to a building. But even more consideration must be taken to how different rooms can come to life when illuminated with the bright and dynamic sunlight.

In the following pages, the Parans Luminaires L1, L2, L3, L4 and L5 are presented.

## Parans Hybrid

Even though the quality of sunlight is superior to that of electrical light, there are times when there is no sun. In order to be able to rely on Parans System as only light source, The Parans L2, L4 and L5 are equipped with fluorescents. These provide a basic light level for times when there is no sun and will dim automatically depending on how much sunlight there is.



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### Parans L5

The Parans L5 gives the impression of a light shaft entering a room from above. The Parans L5 is designed for easy mounting in a standard suspended ceiling with 600 x 600 mm panels. The Parans L5:s are ideal for rooms with standard ceilings, such as offices, hospitals, schools or other public buildings.

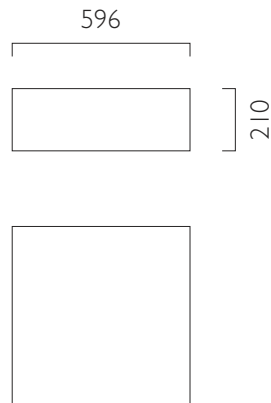
### Hybrid Version

The Hybrid version of the Parans L5 employs standard T5 fluorescents.

### Mounting

The Parans L5 is mounted recessed in ventilated or unventilated suspended ceilings.

Specifications	Dimensions (mm)	Weight (kg)
Parans L5	596 x 596 x 210	3,7







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## Parans L4

The Parans L4:s stretch out like rays from the sun and are therefore ideal to use in corridors but can of course brighten up and give directions to any room. The sunlight will be emitted as cones of light from discrete points in the streams of light in the roof.

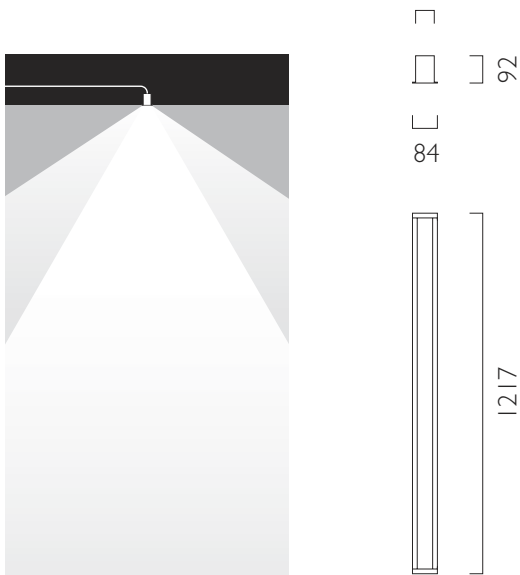
## Hybrid Version

The Parans L4:s employs standard T5 fluorescents to give a basic light level for times when there is not enough sunlight.

## Mounting

The Parans L4 can be mounted separately or together to form a stream of light. It is mounted recessed in ceilings.

Specifications	Dimensions (mm)	Weight (kg)
Parans L4	1217 x 84 x 92	3,7



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### Parans L3

The Parans L3:s are spotlights leaving great freedom to the user to design the light experience. The Parans L3:s have adjustable focal ranges and are easy to direct in different angles. This creates the possibility to freely adjust the illumination images according to each situation. Ideal for highlighting objects or creating indirect lighting by emitting the sunlight on walls or ceilings.

### Mounting

Recessed in ceilings or walls with a quick fixing requiring no tools.

### Specifications

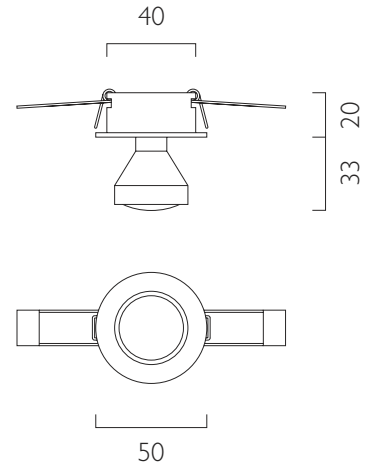
Parans L3

### Dimensions (mm)

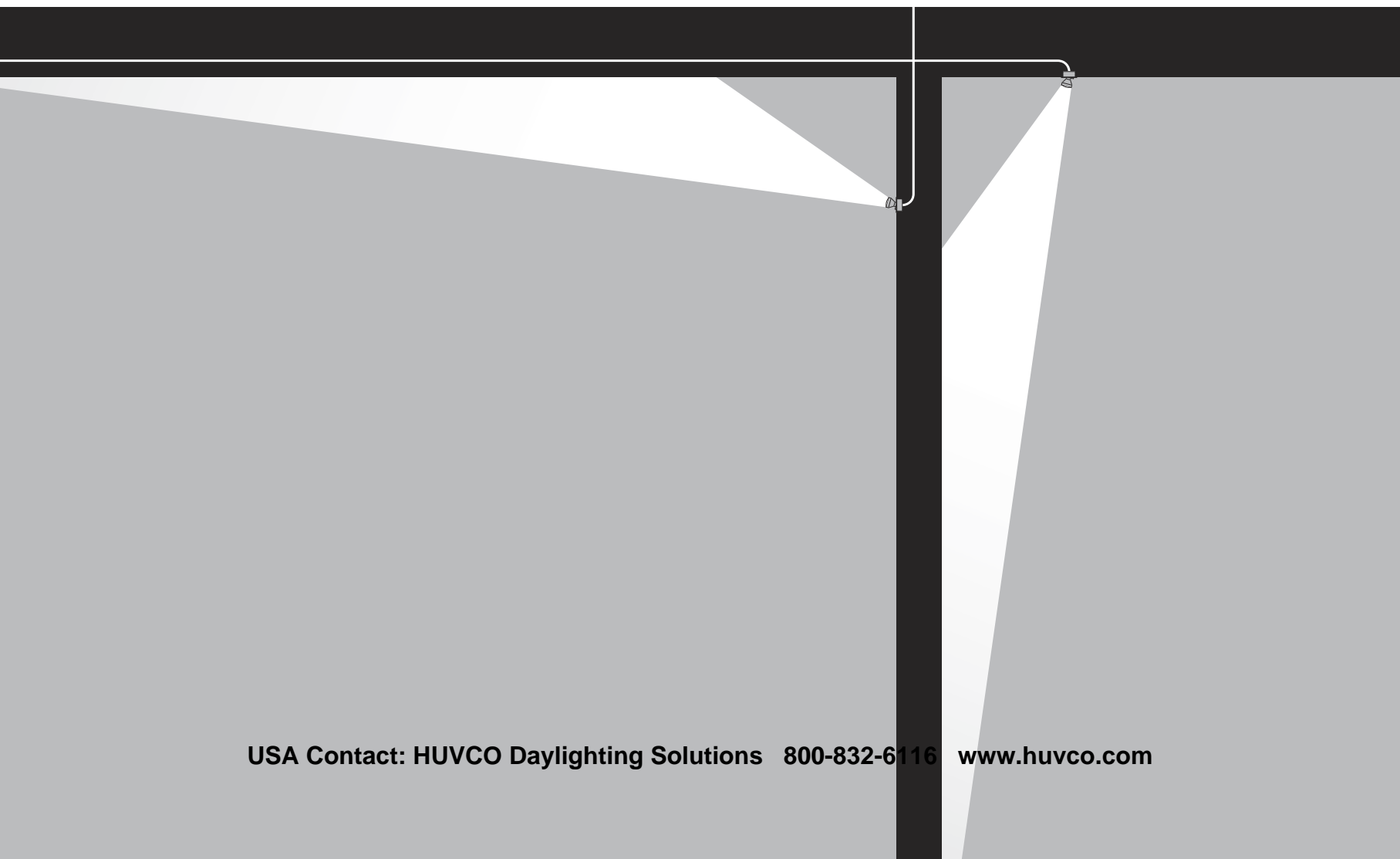
Ø 50

### Weight (kg)

0,053



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## Parans L2

The circular shape of the second series serves as a healthy reminder of the sun, the best light source there is. The Parans L2:s are ideal for illuminating conference rooms, halls and offices for example.

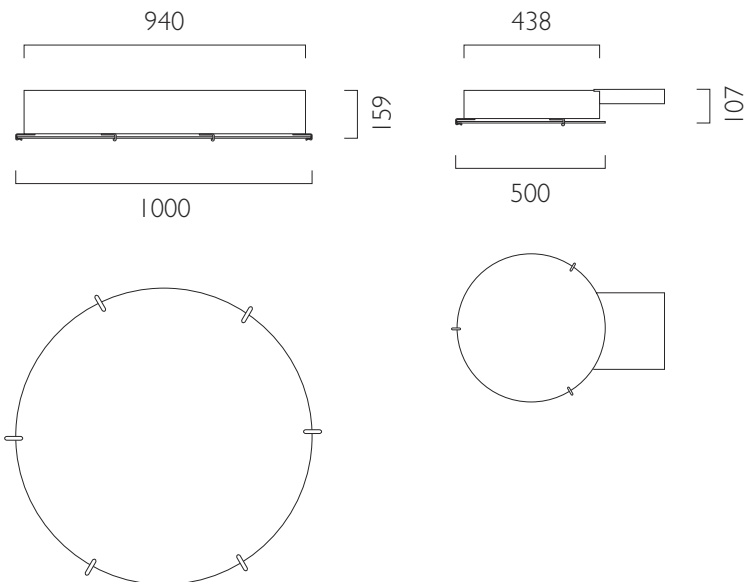
## Hybrid Version

The Hybrid versions of the L2 employs compact fluorescents to provide a basic illumination level for times when there is no sunlight.

## Mounting

The Parans L2 is mounted recessed in ventilated or unventilated suspended ceilings.

Specifications	Dimensions (mm)	Weight (kg)
Parans L2 Small	Ø 500 x 107	4,5
Parans L2 Large	Ø 1000 x 159	5,9



Luminaire: Parans L2 Small



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## Parans LI

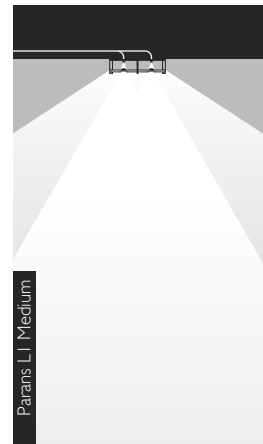
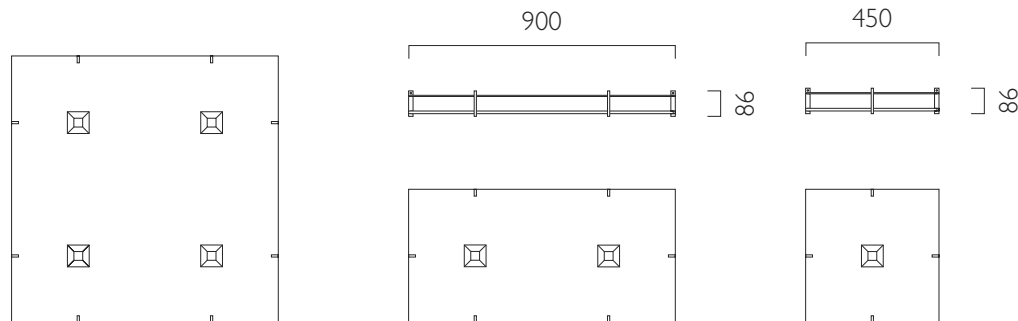
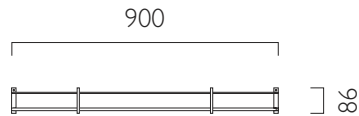
The first series of Parans Luminaires, the Parans LI gives the sensation of standing under the foliage of Birch trees when the sun strikes through. The Parans LI:s are made of thin semi-transparent acrylic sheets. The uniquely light and transparent design make them spectacular to use in a broad variety of interiors, be it an art gallery, a circulation area or a conference room. It can be ordered in three geometrical variations to suit different interiors. The Parans LI is not available as a hybrid version; it is a pure sunlight luminaire.

One key to the success of the LI:s is the way sunlight illuminates the bottom acrylic sheet including its edges. Thereby the sunlight is experienced also from a good distance to the luminaire.

### Mounting

The Parans LI can be mounted directly underneath a ceiling or pending down with wires.

Specifications	Dimensions (mm)	Weight (kg)
Parans LI Small	450 x 450 x 86	3,6
Parans LI Medium	450 x 900 x 86	7,2
Parans LI Large	900 x 900 x 86	14,4



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# References

*Parans' range of installations include for example a restaurant in New York, a private villa in Rome and the University of Edinburgh. Here we present four projects that also represent four different application areas.*

*The Parans System creates a healthy workplace for employees and an inviting ambience for shoppers. In fact, research shows that sales increase by 40 percent when natural light is added to a retail store.*

## **Fashion Store Arena Viktoria**

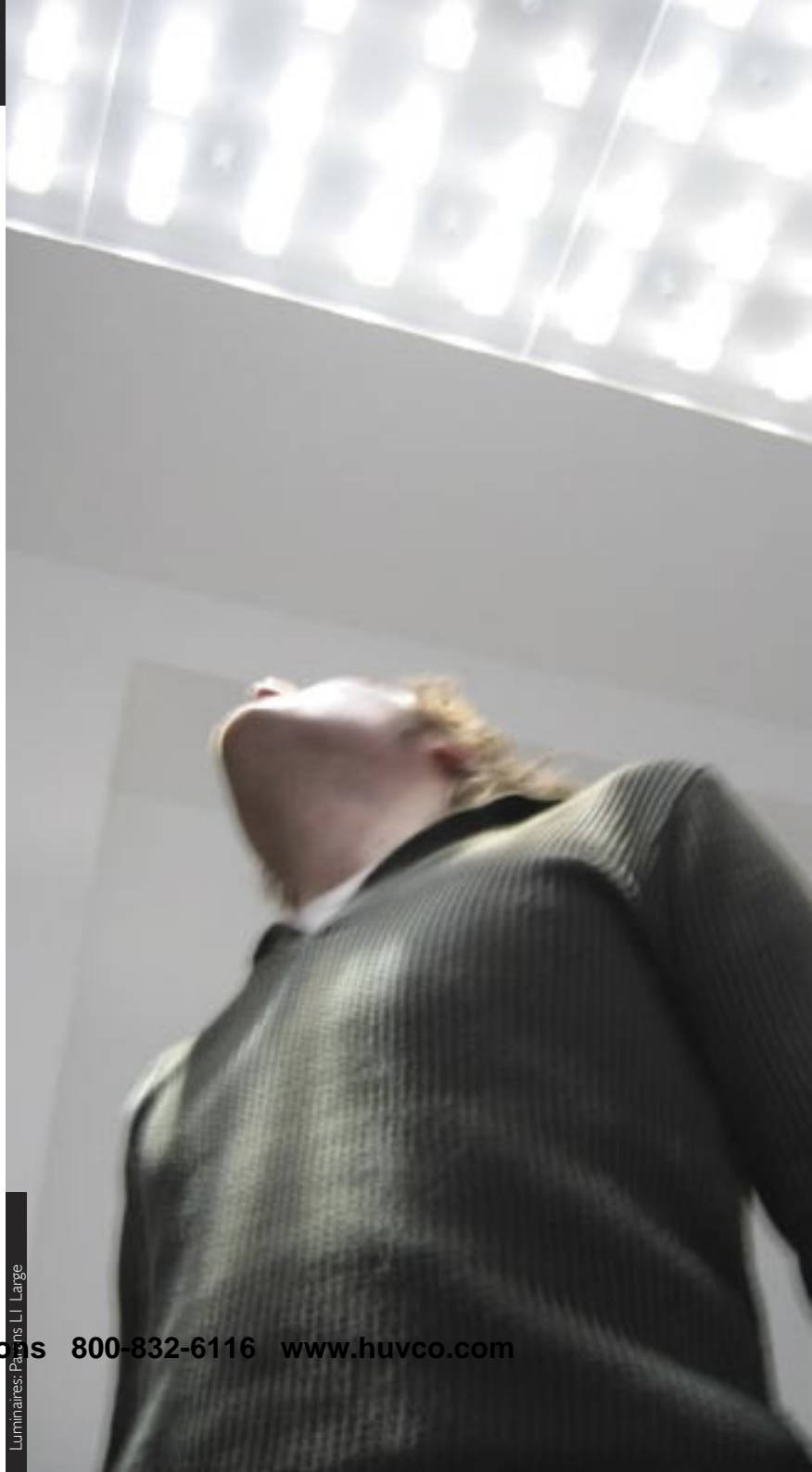
The fashion store Viktoria Arena in Gothenburg resides in a 1910's cinema. Its interior was spectacular from start, but as many stores do, it lacked natural light. Its only connection to the outside world was the street entrance. With Parans' system this has changed. Content staff now report that they can tell the weather by looking at the staircase that the Parans Luminaires illuminate with sunlight. The relaxing and enjoyable atmosphere created by natural light brings economical gains. A Californian study of 108 nearly identical stores revealed that the stores with sunlight in the premises sold 40 percent more than those without.



Solar Panels: Parans SPI

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Luminaires: Parans LI Large





*The lack of natural light was a real problem when recruiting staff to this workplace. The hospital management is now content to report that the Parans System has solved their problem.*

*“Everybody gets happy when the sun shines in”  
– Rolf Skuncke, Head of the Radiology Department.*

#### **Radiology Department, Södertälje**

Typical trademarks of a hospital layout are long and wide buildings with work places located throughout; many without windows. This radiology (x-ray) department in Sweden lies deep inside the building where no daylight normally would reach. With Parans' solution at hand, healthy and living sunlight enters the area through an optical fiber!



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*Museums show us more than just the past. At least the Museum of Technology in Malmö that lights up the way to the future with sunlight from Parans.*

*“The Parans System is an important step towards a sustainable city” – Johan Larsson, Facility and Energy Manager, Malmö City Properties.*

### Technical Museum of Malmö

The purpose of this installation is threefold. First, the brightness and vividness achieved, creates an inviting and healthy atmosphere. Further, the technological principle behind the product has become part of the museum’s showcase. Here, it is as much a source of inspiration as it is educational. Third, the installation saves electrical energy consumption by reducing artificial lighting and its resulting needs for cooling off excess heat. This perfectly demonstrates an effort from the client to turn to environmentally sustainable solutions. Something that becomes increasingly important year after year.



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Luminaire: Parans L | Large Focused

Companies with a solid corporate health policy like IKEA realize that natural light is fundamental for a good working environment.

*"I would recommend anybody to work with Parans. Great products, great company."* – Markus Herchet, IKEA Iberica

#### **IKEA Cash Office**

Sunlight enhances indoor environments on many levels. Its brightness and dynamic spectrum and intensity are among the first qualities that are perceived. The long-term quality of natural illumination in a workplace lies however in the beneficial psychological and physical effects on the employees. Research shows an increase in performance of 6-16 percent and a decrease in absence and employee turnover of the same magnitude, when adding natural light to a workplace.



Solar Panels: Parans SPI

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Luminaires: Parans LI Small

# Frequently Asked Questions

*New technology brings new thoughts and ideas.*

*– How many solar panels do we need for our lobby?*

*– Why is natural light better than artificial?*

*– Is there money to be saved?*

*In this final section, we answer the most frequently asked questions. Don't hesitate to contact us if you have further inquiries.*

## **How many Parans Solar Panels do I need for my Project?**

This depends on the desired light effect, the size of the area to light up and the desired light level. As a guideline, one Parans Solar Panel gives a good natural light experience in rooms of 20-30 m<sup>2</sup>. Since the number of solar panels needed varies with the geographical position, purpose of the installation, illuminated areas and cable lengths, Parans is more than happy to assist you in dimensioning a project!

## **Where can I buy Parans' Products?**

The Parans System is sold through a network of Authorized Dealers. Visit the parans website [www.parans.com](http://www.parans.com) to locate your nearest dealer.

## **Can I become a Dealer for the Parans System?**

Please contact Parans for dealership opportunities.

## **Can I install the Parans System myself?**

The installation of Parans system is comparable to the installation of for example a satellite dish system. The mounting of Parans Solar Panels on roofs or facades and apertures in buildings shall be done professionally.

## **Will I get a Tan under a Parans Luminaire?**

No, the UV-radiation that creates a tan is blocked by the Parans System (and so is IR-radiation). UV-radiation is also harmful to tissues and textiles. Thus, museums love this product since it enables them to show art in natural light (just as classical pieces of art were created in.)

## **What is the Lifetime and Warranty for the Product?**

Parans products come with a 2-year limited manufacturer's warranty. All materials and components are designed for a life span of 30 years.

## **Is it possible to store the Sunlight?**

No, sunlight is instant and with exceptions for the scientific achievement of storing light in a Bose-Einstein element 1 ms, is not storable.

## **Is it really Sunlight that comes out of the Fiber?**

It is indeed the same sunlight that shines on the Parans Solar Panels that is emitted through the Parans Luminaires. Therefore, variations in colour and intensity of the sunlight will instantly be transferred into the indoor environment.

## **Can I turn the System off?**

Yes, as an additional feature a switch can be connected to the system. This feature is valuable in many situations, for example when you have an on-screen presentation.

## **What Maintenance requires the Parans Solar Panel?**

Just as an ordinary window needs to be cleaned, so does the glass on the solar panel. We recommend the glass to be cleaned one to three times per year depending on how dirty the local environment is. As an option, the Parans SP2 can be ordered with self-cleaning glass.

### **What happens when cloudy - and at Night?**

Parans aims at establishing a connection to the outdoor environment. Having the sun as the light source, the Parans Solar Panels do not transfer light when clouds block the sun. This dynamic is one key element of natural light. At night and at other times when there is no sun the Hybrid versions offer complete light solutions.

### **How does the Investment compare to other Techniques for Natural Lighting?**

Already the initial investment is often lower than for competing solutions for natural illumination, such as light shafts and atriums. Furthermore, the Parans System has a competitive advantage in that the light transport does not occupy a building's valuable space. This generates the large economical advantage of being able to use a building's space more efficiently. Especially since the rent and building cost per m<sup>3</sup> is rising faster than many other costs in society.

### **How many Hours of Light will a Parans Solar Panel capture?**

The Parans Solar Panel collects when facing the sun within an angle of 120 degrees, see page 12. The number of captured sunlight hours varies depending on geographical situation (latitude) and desired orientation (east, south, west or north) and time of the year. In most situations the performance allows for 8 hours of sunlight to be collected with one Parans Solar Panel.

### **For which Projects can the Parans System be used?**

Parans' system can be installed as easily in existing buildings as in buildings under construction. There are only two factors that are crucial:

1: The location where the Parans Solar Panel is to be mounted must be exposed to sunshine.

2: The resulting length of the Parans Optical Cable must not exceed 20 meters. See the Parans Optical Cable section.

### **Does the System transfer heat into Buildings?**

No, the IR-radiation that converts to heat when absorbed by an object is blocked by Parans' system. This is a great advantage compared to competing techniques for natural illumination as well as to electrical lighting that creates excess heat. This cooling stands for about 15 percent – a large part of the energy consumption in buildings.

### **How can Parans assist me in planning an Installation?**

Here at Parans our dedicated staff are open to all ideas for projects. Consulting with you over your needs and desires, our expert staff will then make a project plan. Included in the plan is everything from the design and placement of the Parans Solar Panels and Luminaires and pricing right through to details on delivery and installation. Parans' team of highly trained architects, designers and engineers ensure the highest quality in every aspect of the installation.

### **At what point in the Building Construction Process is Installation advisable?**

This differs from case to case but most often, the actual installation is done around the time of preparing interiors and installing electrical lighting.

### **Do the Parans Solar Panels require Electricity?**

The Parans Solar Panel consumes on average less than 2 W, which is a minimal amount of power. The electricity cost per year is less than 1 Euro (based on average European electricity costs).

### Why is Sunlight Healthier than Artificial Light

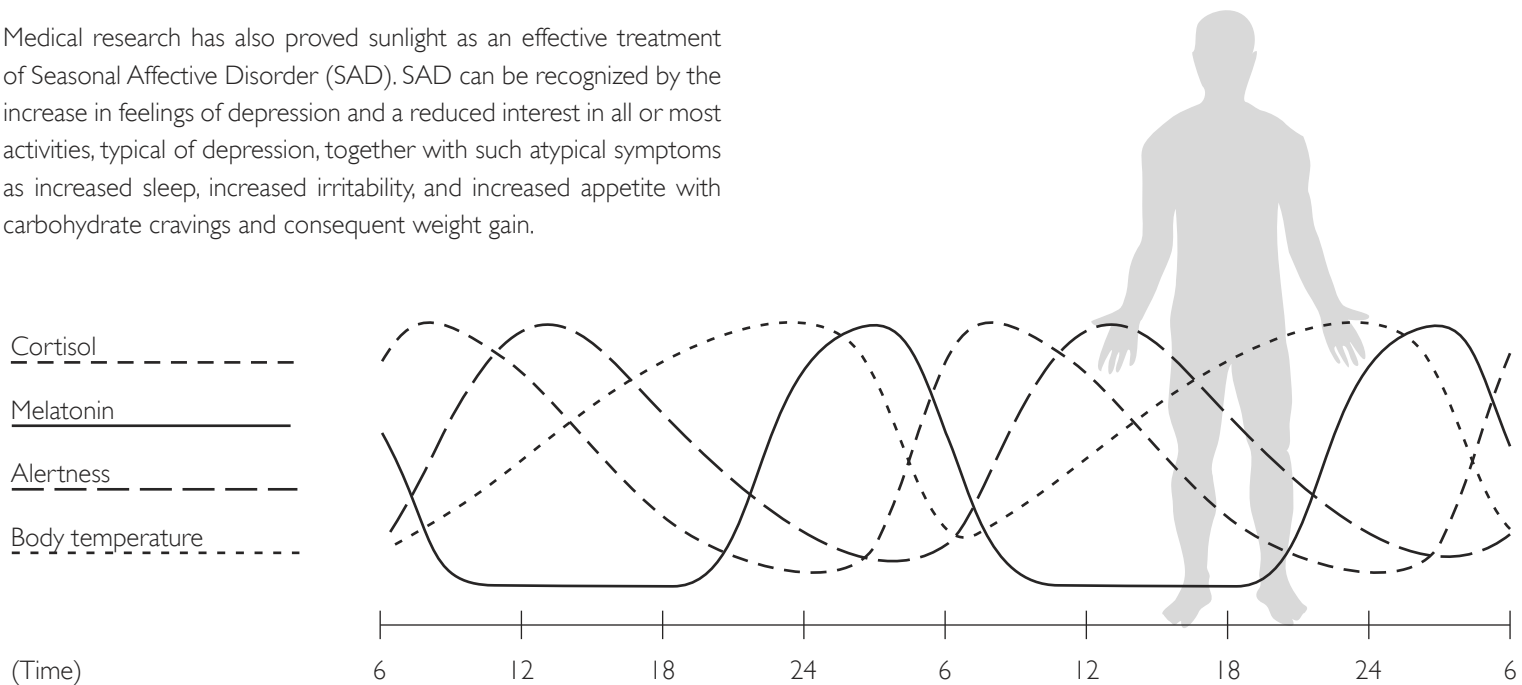
It was only in 2002 that David Berson at Brown University discovered a new cell in the eye that acts as a photoreceptor like a rod or a cone and sets the body rhythm. This ganglion cell is also known as the third receptor.

Natural sunlight has a continuous spectrum, while artificial light lacks many frequencies that the human body requires for essential functions. The human organs are orchestrated to work in harmony with each other, generating a body rhythm that is set everyday by daylight. This rhythm is called circadian and includes production and secretion of hormones (see graph) to regulate functions such as body temperature, awareness and immune system activity.

Medical research has also proved sunlight as an effective treatment of Seasonal Affective Disorder (SAD). SAD can be recognized by the increase in feelings of depression and a reduced interest in all or most activities, typical of depression, together with such atypical symptoms as increased sleep, increased irritability, and increased appetite with carbohydrate cravings and consequent weight gain.

### References to the Facts in the Benefits Section

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- 2 Journal of Property Management, (January 2000)
- 4 Green Building Council, www.usgbc.org
- 5 Australian Commercial Building Sector Greenhouse Gas Emissions 1990–2010, Australian Green House Office
- 6 Heschong Mahone Group "Skylighting and Retail Sales", (1999)



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# REINTRODUCING THE SUN

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