

PARANS

Installation manual

SP3

INTRODUCTION

This installation manual is made for all parties involved in installing Parans solar lighting. It deals with planning and installing the Parans solar lighting system. Parans recommends that this installation manual be studied carefully before the installation and that the installation be performed by professionals.

DEFINITION Parans solar lighting is a lighting solution from Parans Solar Lighting AB (publ), transporting sunlight into buildings.

Parans solar lighting consists of Parans solar receivers that collect sunlight, Parans optical fibre cables that transport sunlight through the property, and Parans luminaires that project the sunlight inside the building.

Parans SP3 is the third generation of the Parans solar lighting system. It contains optics, mechanics and electronics, enclosed in a tubular body made of anodized aluminium, glass and ABS plastic. It is a weather resistant and autonomous unit that tracks the sun with very little site-specific programming.

Parans SP3 features 36 fresnel lenses that each focus into an optical fibre. The fibres are bundled into six optical fibre cables, which are collected in a flexible protective conduit. An electrical cable follows the optical fibre cables and is connected indoors.

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**Read this manual
carefully before
installation!**

INTRODUCTION

Parans SP3 uses the direct sunlight, whose rays are practically parallel and can be focused using lenses. The SP3 has a set of 36 lenses, each focusing the light onto the end of a plastic optical fibre. The fibres are bundled in cables for protection and can be 5, 10, 15 or 20 meters long. These are the cables that transport the light.

The light that comes through the system is true sunlight, and has a cold white tone. We usually do not notice, but the sunlight is actually much colder white than most of the artificial light sources we use. This is one of the reasons why sunlight is so good for us. Our body recognizes the sunlight and starts producing the hormone cortisol, which keeps us awake during the day.

Sunlight is also the highest possible light quality in that it contains all the colours of the visible spectrum. This means that we can actually see more colours and more nuances. It is also completely free from flicker - something that no normal electrical light source can provide, since our electrical grid alternates and creates pulses of electricity.

Optical fibres have the amazing property of trapping light, so that it bounces and travels with very small losses through the material. Exactly this trapping of light, is what makes it possible to bend the fibres - light stays inside anyway. Only at the very end of the fibre, the light is released, and can be used for illuminating our rooms.

On very cloudy days there is no direct sunlight and the SP3 cannot concentrate light. Then the luminaires go dark, and only a small point of light is visible in the fibre end. The system still keeps to the sun path, in order to be ready as soon as the sun becomes visible again. When it does, the light flows through the system and we instantly get access to pure sunlight in our indoor environments. This is how we establish a direct contact with the nature outside of our offices, schools, homes, hospitals and other buildings.



**Handle the fibre cables with care!
The fibres inside must not be damaged!**



**Do not connect to power supply
before the installation is complete!**

INSTALLATION PLANNING

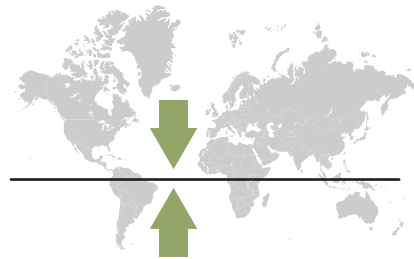
PLAN An installation plan should include a time schedule, qualification and certification requirements for installation workers and building materials, as well as details about the following:

- Luminaire placement
- Placement of the Parans SP3
- Ducting of optical and electrical cables
- Size and placement of roof and wall penetrations
- Place and mode of electrical connection

DIRECT SUN The Parans SP3 requires direct sunlight. Examine the sunlight exposure throughout the year to avoid placing the solar receiver in a shaded spot during seasons when the sun is low.

ORIENTATION For the Northern hemisphere - the installation should be made as close to South-facing as possible. It is never to be installed more than +/-90 degrees from South.

For the Southern hemisphere - the installation should be made as close to North-facing as possible. It is never to be installed more than +/-90 degrees from North.



MAX 20 M From the Parans receiver to the luminaires, the optical fibre cables can be 5, 10, 15 or 20 meters. Shorter cables are preferred, since attenuation in the optical fibers lowers the light output over the distance. Penetration of the roof or outer wall should be planned. Note that installation is easier if the penetration is placed outside the striped area marked in the illustration on the opposite page. *

LIGHT DESIGN The light design should include considerations to how Parans solar lighting differs from artificial lighting. Think of it as an alternative to a skylight or light well and imagine the possibilities.

It has often been used strategically, where many people can experience it, or where it has a special meaning. Parans solar lighting achieves a valuable connection to the outdoor environment is achieved.

We say that we bring the sun inside.

How can that be expressed in your project?



Read this manual carefully before installing!

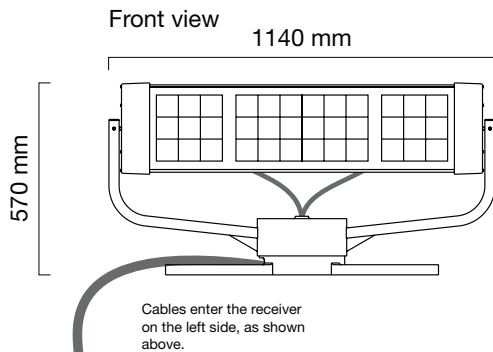


Minimum bend radius is 50 mm.

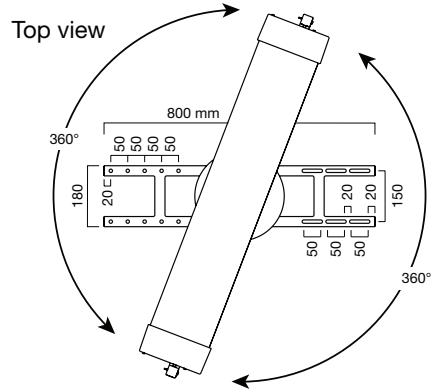


Ensure that the electrical outlet is always powered!

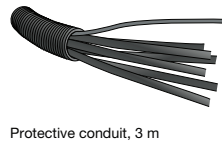
PARANS SP3



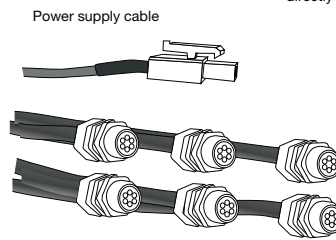
Cables enter the receiver on the left side, as shown above.



Avoid placing the roof penetration directly underneath the foot. *

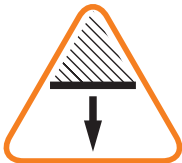


Protective conduit, 3 m



Power supply cable

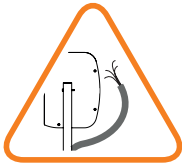
Fiber optic cables, 6 units



Control that ceilings and mounting materials will support the weight of the luminaire!



Take help from a professional!



Do not disconnect the optical fibre cables from the SP3 receiver!



Cables must not touch the panel as it rotates.

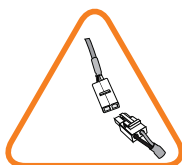


Do not connect to power supply before the installation is complete!

Do not connect to electrical power supply before completing the installation!



Ensure that the installation can withstand extreme weather conditions!



Critical damage if the polarities in the electrical contact are swapped!



Do not twist, cut, crush or in other way harm the optical fibre cables!

Handle the fibre cables with care! The fibres inside must not be damaged!

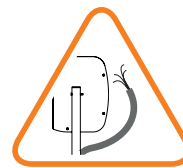
INSTALL THE SP3

PLAN The installation should be planned closely beforehand, so that dangers and damage are avoided.



The installation should be performed by a professional.

PROTECTIVE CONDUIT The protective conduit protects the cables against damage from for example people or birds moving on the roof. It also protects the cables from UV radiation on the outside of the building. The protective conduit should be shortened before sliding it over the cables. If a tighter seal is wanted, this is made toward the bare cables. The protective conduit is then shortened to reach to just before the penetration of the building.



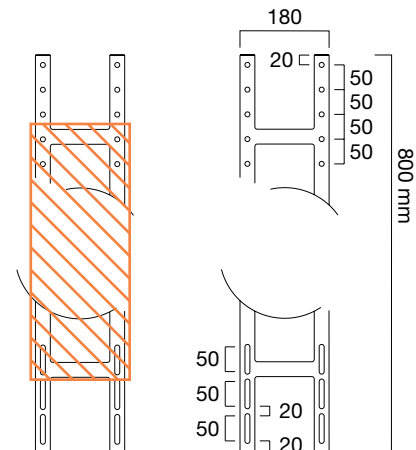
Do not disconnect the optical fibre cables from the SP3 receiver!

PREPARE Prepare penetration of roof and walls where necessary. Extra attention should be given the outer hole bringing the cables inside. This hole must be sealed well around the cables, in order not to leak water and heat.

Parans recommend the use of Parans cable gland for sealing.

MARK Measure and mark where attachment holes need to be drilled in the roof or facade. The holes should match the foot of the receiver or optional roof brackets.

Measure and mark where the roof or facade should be penetrated to allow passage of the optical fibre cables.



BRING TO SITE Bring the solar receiver to the installation site. It weighs around 35 kg and should be handled by two persons.

Avoid placing the roof penetration directly underneath the foot.

DRILL Drill all necessary holes for attaching the Parans receiver and conducting the optical fibre cables.

Handle the fibre cables with care!
The fibres inside must not be damaged!



Do not connect to power supply
before the installation is complete!



INSTALL THE SP3

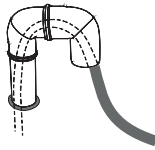


Ensure that the installation can withstand extreme weather conditions!

Attach the optional roof brackets.

ATTACH

Place the receiver on the drilled holes and optional roof brackets. Fasten the receiver in a secure manner. Extreme weather conditions of the area have to be taken into account. Make sure that the installation is secure for strong winds, snow and other weather extremes.

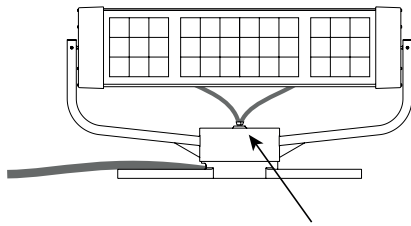


A swan's neck.

The outer hole needs to be sealed. A swans' neck is a way of protecting from rain. Using the Parans cable gland is a solution for sealing tighter, at IP54.

SEAL

Bring the cable through the planned path into the building. Make sure that the white marker is visible over the foot of the receiver. This ensures that the optical fibres are long enough to let the receiver rotate.



The marker is visible over the foot.

Taking into consideration the minimum bend radius of 50 mm, this step is done using normal cable ducting techniques.

DUCT THE CABLES

Parans recommend that conduit be installed through walls if possible, in order to facilitate installation and future service. Such conduit needs to have an inner diameter of 40 mm to contain all six cables.



Minimum bend radius is 50 mm.



Cables must not touch the panel as it rotates.



Handle the fibre cables with care!
The fibres inside must not be damaged!



Do not connect to power supply
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INSTALL THE L1

Parans L1 can be suspended flush with the ceiling or pending down on wires. Depending on the ceiling material, various screws and plugs may be appropriate. Make sure that the luminaire is mounted securely!

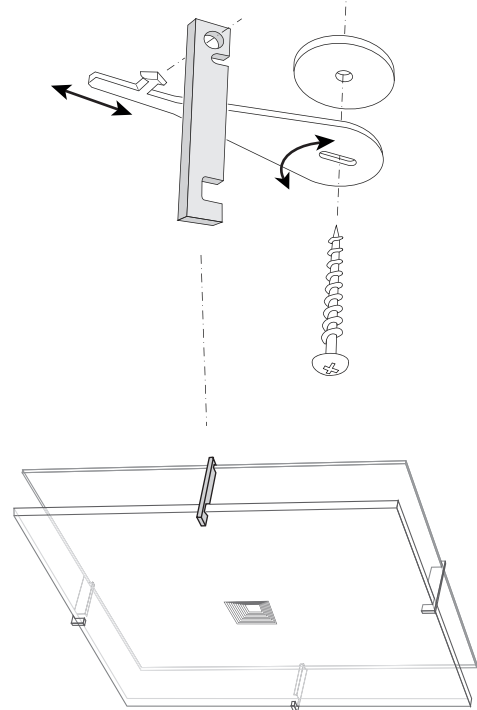
MARK Place the Parans L1 at the intended position and mark out positions for the metal hangers and their screws.

DRILL Make the appropriate holes in the ceiling for the screws and plugs that have been selected.

HOOKS Mount the metal hangers, complete with the plastic washers, as shown in the illustration. Note that the hooks have a smooth and a sharp side. The sharp side must be upwards so that the plastic hooks suspend the luminaire safely.

CABLE Attach the optical fibre cable to the hole in the luminaire back sheet (the thinner of the two sheets), securing it with a nut.

LUMINAIRE Hang up the luminaire by rotating the metal hangers and push the arrow-shaped part of the metal hanger into the plastic hooks.

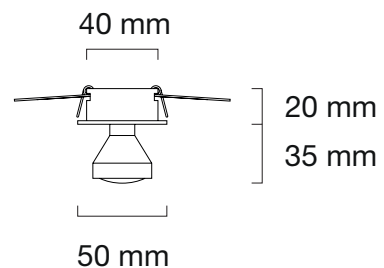
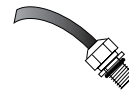


INSTALL THE L3

DRILL Make a 45 mm hole into the ceiling or surface where the L3 spotlight should be recessed.

SCREW Screw the L3 spotlight to the optical fibre cable. Be careful not to twist the optical fibre cable - only rotate the spotlight.

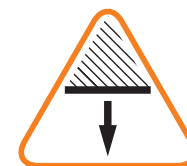
INSERT Bend back the two long springs and insert the luminaire into the opening. The shorter arms of the springs remain in the opening, thus keeping the springs in tension.



Handle the fibre cables with care!
The fibres inside must not be damaged!



Do not connect to power supply
before the installation is complete!

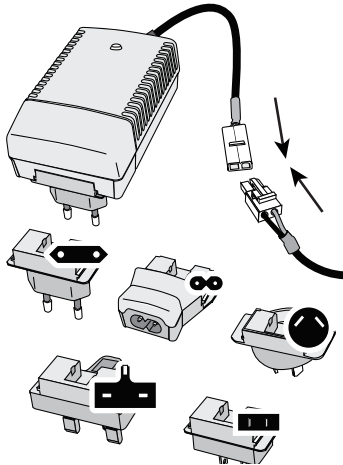


Control that ceilings and mounting materials will support the weight of the luminaire!

ENGAGE SUN PATH



Do not connect to power supply before the installation is complete!



Connect the power supply to engage sun path. The sun should be visible for fastest result. The Parans receiver will perform a start-up sequence in order to locate the sun and sync its sun path. Do not unplug the system during this sequence!

**CONNECT
POWER**

When the sun is visible, the start-up sequence takes less than one hour. As soon as the SP3 finds the sun, it will sync its sun path and keep following the sun.

WAIT

Please be patient when plugging in your system the first time! It needs some time to locate the sun.

Enjoy the sunlight!

ENJOY



Critical damage if the polarities in the electrical contact are swapped!



Ensure that the electrical outlet is always powered!

MAINTENANCE

Normal maintenance consists of cleaning with normal cleaning agents and water 1-3 times a year. The cleaning is comparable to normal window washing. In areas with a high content of particles in the air or many birds and bugs, cleaning may need to be done more often.

DIRT

The SP3 will track the sun as long as it is not buried in snow and ice so that it is blocked. If the glass is covered in snow, very little light will get focused into the optical fibre. In order to make it function, snow needs to be removed. Otherwise just wait for spring and the receiver will start working again.

SNOW

The SP3 will protect its optics if heat builds up to over 60 C inside the receiver. It then needs to turn the lenses away from the sun, and the receiver will not collect any sunlight. If this happens on a regular basis, the installation spot is not optimal and heat needs to be diverted.

HEAT

TROUBLE SHOOTING

WEATHER Control that the sun is visible on the sky and is not covered by clouds. The Parans system needs direct sunlight to work.

POWER Control that the power supply unit is powered. This unit is placed indoors, by the electrical outlet. A green diod is lit when the unit is powered.

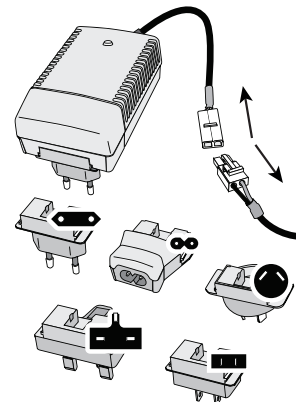
DIRECT SUN Control that the Parans receiver is not covered or shaded by nearby objects. If the glass is dirty, it should to be cleaned as mentioned under Maintenance.

ROTATION Make sure that no nearby objects block the rotation space of the Parans receiver.

CABLING Control that electrical and optical fibre cables have not been broken or damaged.

RESET If no problems have been found so far, reset the system in order to perform a new start-up sequence. Unplug the power supply, wait for 5 seconds and then plug it in again. The Parans system performs the same start-up sequence it did when it was first powered, see Engage Sun Path. Do not unplug the power supply during this sequence.

CONTACT US If the problem remains, please contact your local reseller or Parans Solar Lighting and we will assist.



FAQ

- How much light will one system collect?** The collected light from one SP3 is approximately 6000 lumen. A little light is absorbed and lost for each meter of optical fibre cable, so as an example the output is around 3700 lumen after 10 m.
- What happens when it is cloudy or dark?** The Parans solar light system works on the parallel light of the sun and needs direct sunlight to work. On partly cloudy days, this gives a beautiful dynamic light, as clouds pass overhead. On overcast days and at night artificial lights are needed.
- How many hours of sunlight will I get?** The SP3 can follow the sun over all sun hours of the day. The amount of sun hours varies with the local weather and over the year. The SP3 makes sure you will not miss those sun hours.
- Will I get a tan?** No, the UV-radiation is blocked from entering the Parans system. This means that your skin will not tan, and furniture and other surfaces will not bleach. Museums love our light, since it enables them to show classical art in natural light just like when it was created, but without destroying the colours or materials.
- Will the system transmit heat?** The Parans system also filters out IR, so very little heat is brought inside. In combination with the tiny penetration of the building, this may be a key property when working with energy efficient buildings. Cooling accounts for about 15 percent of the energy consumption in buildings.
- Can light be stored?** Sunlight is instant. With the exceptions for the scientific achievement of storing light for 1 ms in a Bose-Einstein element, light cannot be stored.
- What is the lifetime?** The products of Parans come with a 24 months' limited manufacturer's warranty. All materials and components are designed to sustain at least 15 years.
- Can the system be moved?** Yes, it can, but the receiver needs to be programmed for the new location. Contact your reseller or Parans.
- How much energy does it consume?** The Parans receiver consumes 10 W on average. The electricity cost per year is then less than € 10 (based on average European electricity costs).



Parans Solar Lighting AB (publ)

Kämpegatan 4C
S-411 04 Göteborg
Sweden

+46 (0) 31 20 15 90
info@parans.com
www.parans.com