FAQ'S ABOUT LED IN RETAIL

We know what you need to know about LED in retail environments

FAGERHULT


important for

LED - the future of lighting?

THE DEVELOPMENT OF LED'S has been rapid and is considered by many to be the future of lighting. With promises of increased energy efficiency, extended lifespan and their associated environmental benefits, it's really no surprise it's the subject on everyone's lips.

But as always with emerging technology it is always worth taking a step back. What exactly are LED's? Is it delivering on its promises? How can it best be used in retail? What is the return on investments?

These are some of the key questions which arise on a daily basis and there is clearly a need for information on how LED's can be used to create commercial viable environments.

Within this brochure we wanted to look past the hype and promotion to provide straightforward answers to a selection of the frequently asked questions (FAQ's) we have encountered.

By taking this approach we hope we can provide an overview of the technology and how it can be implemented within a retail lighting scheme.

Frequently asked questions about LED

FAQ

Gina Tricot, Köln. RGB LED's installed in the store's lower part on top of a ceiling grid. Read more about the project: www.fagerhult.com/retail

OVER THE FOLLOWING PAGES we answer a number of questions that we have been frequently asked about LED.

Basic questions

1. What is LED?

LED stands for Light Emitting Diode. An LED is not a traditional light source; it is a semiconductor that emits light. Nor is it a "new technology," as early as 1927 a Light Emitting Diode was presented in a Journal by the Russian scientist Oleg Vladimirovitj Losev. Although this wasn't the first, it was the first report to be widely distributed. The first LED with a visual spectrum was developed in 1962 by Nick Holonyak Jr, who is often seen as the "father of the light-emitting-diode".

An LED consists of a semiconductor with coating on a small plate which, depending on the material used, emits different types of light when a current is passing through the diode. The light emitted is the result of a physical phenomenon known as electroluminescence.

"The energy saving from an LED is not that significant yet as it is described in the press, articles or in some marketing materials..."

2. How does a LED work?

In a normal incandescent light bulb you can use either a direct current (DC), or an alternate current (AC). An LED is a semiconductor and only uses the direct current, which necessitates the polarity is also in the right direction. This principle is referred to as forward voltage. If the polarity is wrong, or backwards, nothing will happen, following the same principle as a non-return valve in a water pipe.

When the forward current is flowing through the diode the electrons fall into holes with lower energy levels, or junctions, releasing energy in the form of photons. Light radiation.

3. How long is the lifetime of a LED and the driver?

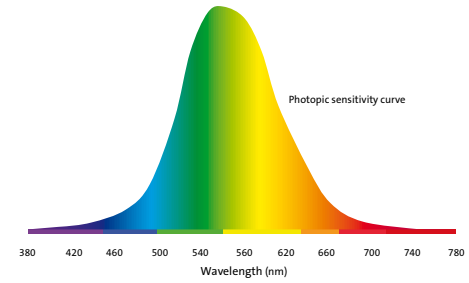
The manufacturers of LED's and their drivers claim 50,000 hours, defined as the LED operating with more than 70% of its output. While this is not a formal standard, it is the level, or criteria, being used throughout the lighting industry.

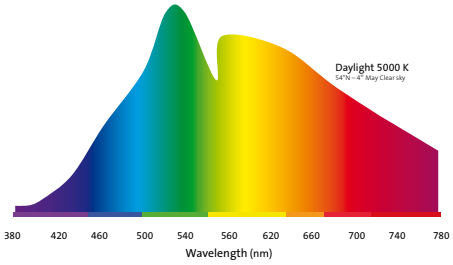
4. What about the colour temperature and colour rendering?

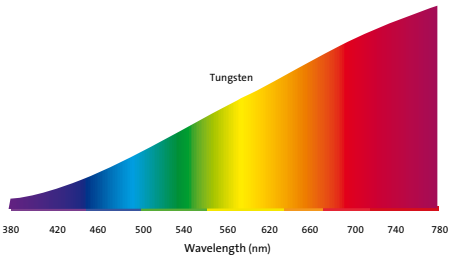
Neither the colour temperature nor colour rendering of an LED is exactly the same as a traditional light source. The existing instruments and processes for measuring were developed for traditional light sources and aren't suitable for LEDs. The CIE are currently researching and developing new ways to conduct these measurements.

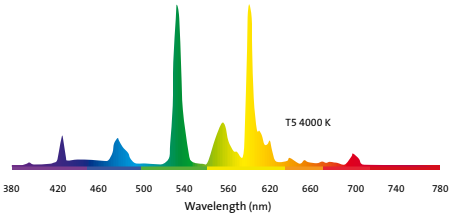
While the Colour Convention Temperature may appear the same on different datasheets, the actual light experienced can differ between manufacturers, so it is important to pay consideration towards this when choosing your LED solutions. Colour rendering is closely tied to the spectral distributions, the diagrams show typical distributions for daylight, tungsten, T5, CDM and LED. Using spectral distributions, it can be predicted what colours will be rendered properly and where issues might arise.

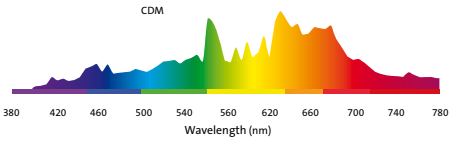
Spectral distributions

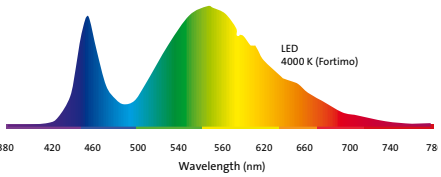












"Regarding the color consistency of LED's you can't only refer to the color temperature (K)."

5. When one reads about LEDs it always says something about BINs, what is this and how does it affect the LED and the colour temperature?

Bin coding is simply a method of describing the specifications of an LED. The code consist of 4 parts; the flux rating, tint, VF (forward voltage) and colour. LED's with identical/ similar wavelengths or colour temperatures are put into different bins. These are used to determine the quality of colour consistency between different LEDs.

The colour consistency of LED's can't be solely expressed through the colour temperature (kelvin). The colour quality of a 3000k LED, for instance, may vary dependent on which bin it belongs to. An LED from bin 7C2 is more yellow than one from bin 7D1, which is more pinkish. Within the spectrum of a 3000k LED the different bins move from a more gold/ orange appearance, through to a more green colour and pink- as demonstrated in the chart opposite. These fluctuations of colour highlight the importance of paying close attention to an LED's bin and its specification.

Manufacturers are currently addressing some of the issues associated with colour bins, with particular reference to warm and neutral white, to make it easier to identify and specify the LEDs. This is particularly important for retail lighting where high colour consistency is required and where there should be little or no difference in colours between the LED's being either installed or replaced.

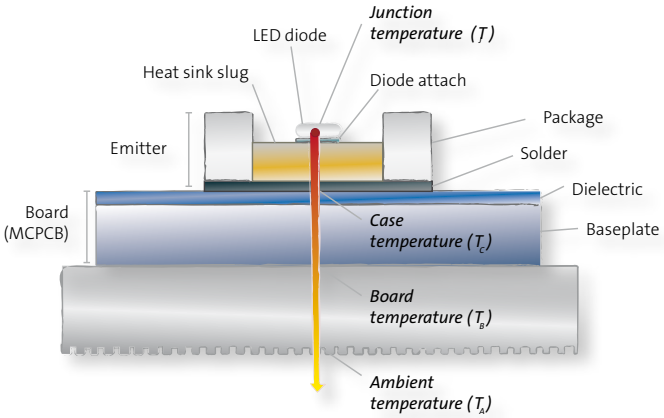
ANSI C78.377-2008 is a standard developed by the American National Standards Institute (ANSI), the American National Standard Lighting Group (ANSLG), and the National Electrical Manufacturers Association (NEMA) in 2008 to standardize the description of tints in LED's and Solid State Lighting.

6. What about heat radiation?

It is widely believed that, when using an LED, there will not be any heat radiation within the beam. This is not entirely accurate as there is a very small amount of heat radiation. While it is barely noticeable heat is produced. Compared to a traditional light source, which is cooled by the atmosphere, an LED requires a more advanced and engineered heat management system.

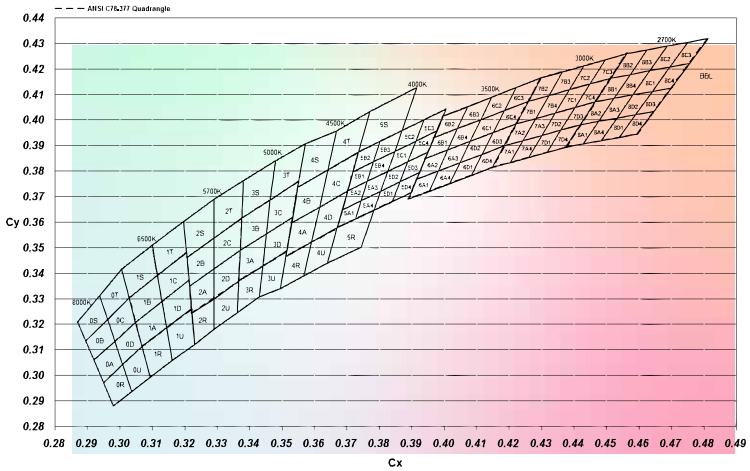
When transforming any energy from one form to another form, e.g. electric energy to visual light radiation, there is always a large amount of redundant energy which is always transformed into heat in one way or the other.

Transforming energy



Source: PNNL

ANSI White



7. In short, what are the pros and cons with LED?

There are many dimensions to such a question; here we illustrate how LED stands in relation to other light sources common in retail lighting.

	Fluorescent tubes	Compact fluorescent	HID	Dichroic	LED
High ceiling installation	●	●	●	●	●
Low ceiling installation	●	●	●	●	●
Supermarkets	●	●	●	●	●
Fashion	●	●	●	●	●
Car showrooms	●	●	●	●	●
Jewellery etc	●	●	●	●	●
Shelve lighting	●	●	●	●	●
Spotlights	●	●	●	●	●
Effect light	●	●	●	●	●
Refrigerator/Freezer	●	●	●	●	●
Sauna	●	●	●	●	●

● *Very suitable* ● *Suitable* ● *Could be suitable* ● *Not suitable* ● *Very unsuitable*

Environmental aspects

8. Is the LED an energy saving light source?

The energy savings from an LED are not yet quite as significant as what is often reported in the press and promotional materials, which compare the technology with incandescent or Low Voltage Halogen (dichroic) light sources.

When comparing with HID (High Intensive Discharge lamps) there is still a lot to do. When looking only at the efficacy of lumen/wattage the LED is really good in comparison with HID. But if we're looking at the efficacy for the whole power conversion of electrical energy into a viable visible light it is a completely different situation, as shown in the table to the right.

9. How is the LED light source recycled?

LED light sources are essentially electronic components consisting of PCB materials, diodes, semiconductors etc, so methods used are the same as traditional electronics. They have to be collected separately from household waste and have to be treated like standard electronic equipment.

Comparing light sources

	Incandescent (60W)	Fluorescent (typical linear CW)	Metal Halide	LED
Visible Light	8%	21%	27%	15-25%
IR	73%	37%	17%	~ 0%
UV	0%	0%	19%	0%
Total Radient Energy	81%	58%	63%	15-25%
Heat (Conduction+ Convection	19%	42%	37%	75-85%
TOTAL	100%	100%	100%	100%

10. How about the sustainability of LED?

LED is a very sustainable light source due to its high efficacy and long life potential, with the efficacy of LED chips continuing to increase dramatically. Well-established LED sources, common in the market today, can deliver products with a steady state efficacy of over 60 lumens per watt in high quality warm white light (including losses accrued through the driver and thermal management).

Furthermore their directionality means that optical efficiency can be much better than traditional sources when combined with optics such as lenses or reflectors. Therefore, the required light effect can be achieved with a lower source efficacy. LEDs with cooler white light are even more efficient and can be used when this light is deemed acceptable for the application (refrigerated display lighting is a good example of this). In addition, LED products are capable of extremely long lives when engineered correctly.

The above numbers represent today's state-of-the-art from commercially available products. LED technology continues to develop at a fast rate however, and laboratory figures of >200 lumens per watt are now being quoted from some of the major manufacturers. These LEDs are not currently commercialised.

One note of caution is that the benefits of LED, with respect to sustainability, are only achievable if the proper attention is paid to how the LED is embodied and engineered into the product and application in which it is to be used. To do this a good understanding of how a given LED package performs under different conditions is required.

Practical & conceptual aspects

11. When can I completely use LEDs in my store?

With existing technology it will be very difficult to replace all traditional light sources in a store with LED's.

With the rapid developments this may change in the future, although the appearance of the light radiation from each type of light source is very specific. As such the basis for selecting the most appropriate light source should be driven by the type of installation, application and the type of light required.

12. How can I integrate LED into my existing lighting solution?

That depends on what type of lighting solution there is. While it is possible it is not always the most efficient way to do it. Often it will require a complete overhaul of the

"Normally the producers of the LED and the electronics in a driver claim a life time of 50 000 hour."

lighting solution as simply retrofitting the luminaires can compromise the light quality.

A large number of the retrofit LED light sources on the market today are of varying quality. Most of them act as a replacement for dichroic (HRGI) up to 50W and for other types of halogen lamps. Some are also possible to dim. They can work well where the requirements for light output, light quality and efficiency are a bit lower than normal, for example in domestic environments.

13. How can I have the same rendering with LED as with my current technology?

With existing technology the only way to achieve this is by using a module with a large number of LED's with different wavelengths to cover the entire visual spectrum. This approach is not only costly but it also places high demands on heat management and space.

14. Can I change the light source into a LED and keep the fixture?

With some low voltage fixtures yes, but problems can emerge depending upon the suitability of the transformer for LED modules. *For more information, see question 11.*

15. Why is LED so expensive?

LED's are still produced in relatively small volumes compared to other materials (e.g. silicon wafers) and, consequentily, don't enjoy the same economies of scale.

Increasing the global LED volume and capacity is key to both decreasing their cost and delivering lower price for a given light output. In addition, a good LED product requires significant additional engineering to ensure reliability and consistency of performance.

LED and the future

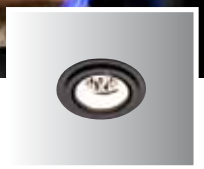
16. How will LED develop in the near future?

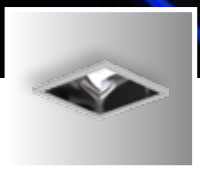
There are anticipations of an enormous increase in efficiency to ~150 lm/W at component level and a reduction in the price to less than €1 for 100 lm in 2011. LEDs in the future will also differ from their 2010 counterparts in terms of higher driving current and densities, standardisation and a large number of application oriented products for different environments.

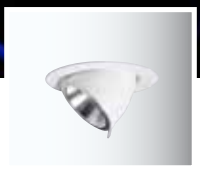
Over the next few years LED's are predicted to continually increase in efficacy. Some distributors have LEDs from leading manufacturers under qualification in laboratory that, if proved to be reliable, will lead to further dramatic efficiency increases, up to 50% compared to the current best available technology. Even this would still leave some distance for further improvements. For general lighting the market will evolve with more standardised LED packages, light engines and modules for different applications.

Also there will be dramatic improvements in quality of light thanks to developments in phosphor technology. Packages will evolve that can retain their efficacy at higher drive currents, making higher lumens possible from small source sizes. This will allow even better optical control and the opportunity to reduce the number of lumens needed for the desired light effect.

Finally there will be a greater focus on system developments, with smarter LED drivers, more dynamic lighting (colour change, dimming) and remote management systems all being developed further and specified in greater quantities.







17. How does the LED light source affect the product development?

PETER GUNNARSSON, *Product Development Manager, at Fagerhult:*

- It is important to monitor new trends as well as technological changes and take advantage of its benefits once you develop new luminaires. Together with the product & brand team a well thought out process is implemented in able to deliver innovative, high quality products.

The rapid developments in LED technology are making us renovate our knowledge bank in terms of product development. It is very important to understand how the light source is constructed and how it works. These technological insights affect the design and function of the products in terms of thermally material, ventilation, fans and control gears, amongst others.

Fast moving technology

With the speed of progression in this field we can see a significant increase of the number LED products on the market and also a demand from our customers. We are continuously working on developing LED versions of existing products, as well as creating new ones. In the near future we will dedicate more than 50% of our development to LED.

Suppliers are important

At this stage we are working with several external LED suppliers, as they have the best knowledge about all the components. With the large number of LED manufactures worldwide ensuring we select the best supplier, who is at the forefront of development, is absolutely paramount. The developing areas today are luminance, heat, colour rendering, associated components and, crucially, making the LED even more commercial viable. Until then LED will mainly be used for decorative effect lighting where it still is cost defensible in retail. But in the near future, once the technology has improved, we will start to see complete LED installations."

18. Are there any standards for LED?

Not yet for modules but the work is already underway to create these. Zhaga is an industry-wide cooperation aimed at the development of standard specifications for the interfaces of LED light engines. The consortium consists of approximately 180 different companies worldwide, around 50% of which holds a position as a regular member.

An LED light engine is an LED module with defined interfaces that do not depend on the type of LED technology used inside the light engine.

The Zhaga initiative will enable interchangeability between products made by differ manufacturers. This will be achieved by defining interfaces for a variety of application- specific light engines. Zhaga standards will cover the physical dimensions, as well as the photometric, electrical and thermal behaviour of LED light engines. Fagerhult is a regular member within the Zhaga consortium and is active within the steering committee with full voting rights. As part of different workgroups within Zhaga, we are helping with the creation of the standardisation within this field.

For more information please visit:

http://www.zhagastandard.org/

19. Does LED offer new possibilities in the concept development?

ANDERS STRÖMBERG, *Conceptual Lighting Design manager at Fagerhult:*

- To create a plan for an inspiring, energy efficient lighting concept that increases the commercial environment in your shop is a challenge. Together with our Lighting Design Team we translate your brand into a well thought out visual experience which evokes emotions.

As a concept developer it is equally important to be updated in both upcoming trends and new technologies. They go hand-in-hand when creating exciting lighting concepts. We are currently working more frequently with the LED light source and we also see that our customers are much more interested in it and what it offers. LED has its advantages that can contribute to a more dynamic design.

White in several shades

For example, we have the tuneable white LEDs which offer the possibility to shift colour temperature between warm white and cold white (2800K-6500K). This option can be used in fitting rooms when you want to view your outfit in different colour settings. We have seen this in fitting rooms before - but then you had to install large fluorescent tubes behind different interior elements. Now you can conveniently install the small LED light source integrated in the mirror instead.

The tuneable white LEDs are also very useful in the main store. Why not change the colour temperature according to the season; in the winter you might use warm white lighting to create a cosier atmosphere and in the summer, cool white to create a fresher impression. And when it comes to simulating natural daylight within artificial windows and walls this light source is also superior. The moving fluctuations are far more natural that what any other light source could present.

"Technology will constantly advance and this will naturally affect how we look at retail lighting and also concept design."

Say it in colour

When some customers want something extra aside from the traditional white light - then colourful, effect lighting can be the answer. With the RGB LED you can create a dynamic lighting concept that evokes emotions and impact. It is a fact that different colours evoke different feelings; green comforts and soothes, yellow energises, blue cools and red is passionate. We can take advantage of this and use the ability to customise the lighting and create new settings for different occasions. Why not let pink accentuating light illuminate the products on Valentine's Day? With an additional control system you open new possibilities for a customised lighting program in which you can adjust, dim and colour shift the lighting as you like.

Integrate in small spaces

The small LED light source is also useful for integrated lighting. As a concept developer it is a huge benefit to be able to use LED in shelves and in other furniture and when you need to illuminate products in small spaces.

As the technology continues to advance, it will offer new possibilities and change the way we approach both retail lighting and concept development.

If you have any more questions about LED don't hesitate to contact us for help and advice:

retail-info@fagerhult.se

Phone: +46 33 722 15 00

One of our latest retail concepts with LED; Desigual, Göteborg. Here LED's in different monochromatic colours has been used to create colurful effects. Read more abou the project on; www.fagerhult.com/retail

LED


Marathon LED


Pozzo LED


Noc LED


Pleiad Comfort G3


Pleiad Compact G3


Phase LED


Pleaid Power LED


Freedom

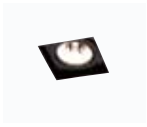

See Prosper Suspended


See Prosper Track


Gaudi LED


Pleiad LED Downlight


Pleiad LED Wallwasher


Dip LED


Do LED

Marathon

"Marathon comes in a classic cylindrical shape and is ideal for any retail environment and it fits perfectly with the surroundings."

DESCRIPTION

Universal 3 phase adapter included. Installed on 3-phase track or FixPoint-brackets. Ballast housing and luminaire housing of enamelled aluminium extrusion/ die cast aluminium. Baffle of thermal plastic. White (RAL 9010), Black (RAL 9005).
500lm unit; 7 x 1W with lens optics for different beam angles. 3000K and 4000K versions available.

POWER SUPPLY

230V/ 350mA constant current

ACCESSORIES

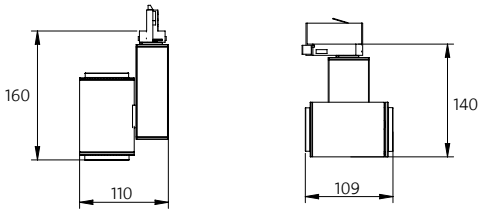
Colour filters, honeycomb louvre.

OTHER INFORMATION

Pan 360°, tilt 0-90°.

Marathon LED

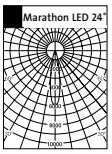
IP20 | CE | 850°

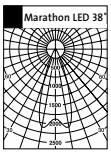


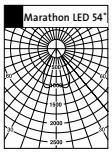
LED 7W	*Colour code*	*White*	*Black*
24°	3000K	**76687**	**76681**
24°	4000K	**76688**	**76682**
38°	3000K	**76689**	**76683**
38°	4000K	**76690**	**76684**
54°	3000K	**76691**	**76685**
54°	4000K	**76692**	**76686**

Light source	*Ballast*
LED unit included	Elctronic Driver included

Light data







Accessories	
96962	Marathon LED colour filter, red
96963	Marathon LED colour filter, green
96964	Marathon LED colour filter, blue
96965	Marathon LED colour filter, yellow
96966	Marathon LED honeycomb louvre

Phase

"Elegance in a compact form, Phase LEDs is available with a variety of light sources and full directionality; discreetly producing the right light in the right place."

DESIGNER

WACO design

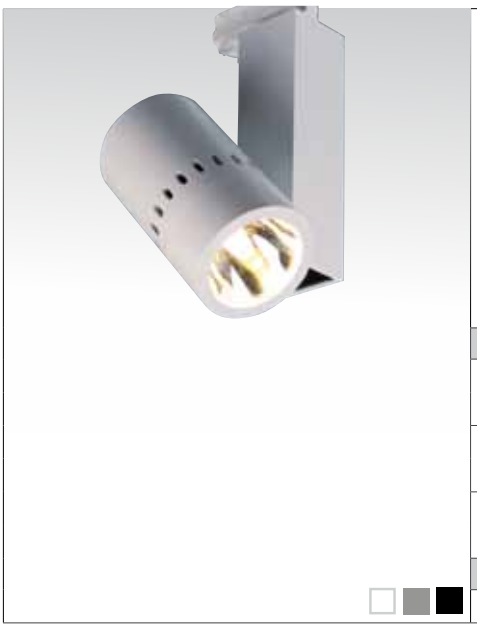
DESCRIPTION

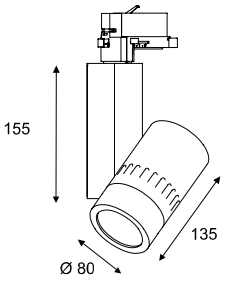
Phase LED is the LED variant of the Phase range. It comes in 3 colours; black, white and grey and in 3 beam angles: 20°, 40° and 60°. The core is a CRI > 80 LED engine that produces 1000lm or a CRI > 90 LED engine that produces 700lm There is a choice between 3 colour temperatures: 2700K, 3000K or 4000K.

POWER SUPPLY

3-phase 230v track

Phase Spot



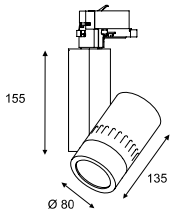


LED	Kalvin	White	Grey	Black
Narrow	3000K	**700.05.KE.03.1**	**700.05.KE.05.1**	**700.05.KE.01.1**
	4000K	**700.05.KF.03.1**	**700.05.KF.05.1**	**700.05.KF.01.1**
Medium	3000K	**700.05.KE.03.2**	**700.05.KE.05.2**	**700.05.KE.01.2**
	4000K	**700.05.KF.03.2**	**700.05.KF.05.2**	**700.05.KF.01.2**
Wide	3000K	**700.05.KE.03.3**	**700.05.KE.05.3**	**700.05.KE.01.3**
	4000K	**700.05.KF.03.3**	**700.05.KF.05.3**	**700.05.KF.01.3**

Weight	Light source	Ballast
1,2 kg	LED unit included 3000K/4000K	Driver included

Configurator

Phase LED



20°		40°		60°	
☐	700.05._.03.1	☐	700.05._.03.2	☐	700.05._.03.3
▒	700.05._.05.1	▒	700.05._.05.2	▒	700.05._.05.3
■	700.05._.01.1	■	700.05._.01.2	■	700.05._.01.3

Select source			
LED 2700K	KD	1000lm	H 355° - V 2x90°
	230V ~ ECG	23W	CRI > 80
	GEAR INCL.	700mA	
LED 3000K	KE	1000lm	H 355° - V 2x90°
	230V ~ ECG	23W	CRI > 80
	GEAR INCL.	700mA	
LED 4000K	KF	1000lm	H 355° - V 2x90°
	230V ~ ECG	23W	CRI > 80
	GEAR INCL.	700mA	

Pleiad Power LED

"Pleiad Power LED is a small, efficient downlight that brings power, economy and energy efficiency into one complete package. The luminaire is designed for applications which require a varied generous, general light."

DESCRIPTION

Recessed fixture for installation in ventilated or unventilated ceilings. Mounting springs for easy tool free installation included. The supplied assembly ring should be used when installing in soft ceilings. Lamphousing in die-cast white (RAL 9016) lacquered aluminium. Cooling of black lacquered aluminium. Reflector in specular faceted aluminium.

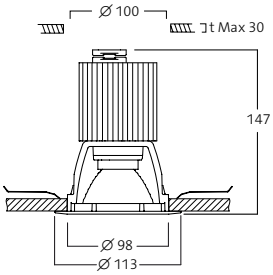
POWER SUPPLY

Operating voltage 230 V.

OTHER INFORMATION

Pleiad Power LED Flex allows pan 355°and tilt 0-60°.

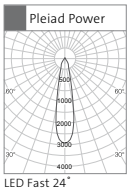
Pleiad Power LED Fast



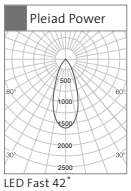
LED Fixed	LED module , lm	Colour code	Luminous flux, lm	Efficiency lm/W	Art.no.
18W, 24°	1000	3000K	897	43	**77530**
18W, 24°	1000	4000K	885	43	**77531**
18W, 42°	1000	3000K	875	43	**77532**
18W, 42°	1000	4000K	864	42	**77533**

Weight	Light source	Driver
0,7 kg	LED unit incl.	Driver ord. sep.

Light data

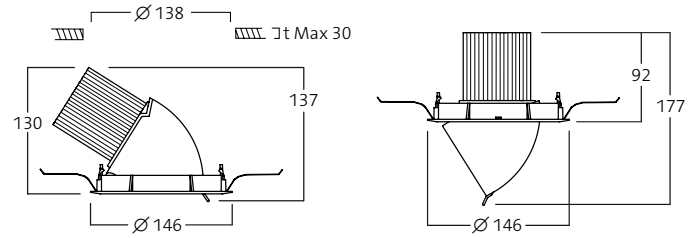


LED Fast 24°



LED Fast 42°

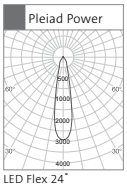
Pleiad Power LED Flex



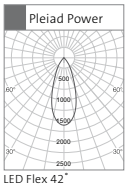
LED Flex	LED module , lm	Colour code	Luminous flux, lm	Efficiency lm/W	Art.no.
18W, 24°	1000	3000K	897	43	**77534**
18W, 24°	1000	4000K	885	43	**77535**
18W, 42°	1000	3000K	875	43	**77536**
18W, 42°	1000	4000K	864	42	**77537**

Weight	Light source	Driver
0,9 kg	LED unit incl.	Driver ord. sep.

Light data



LED Flex 24°



LED Flex 42°

Accessories	
Driver	
99006	LED driver 33W 350/700 mA
41953	LED driver 30W 700 mA DSI/DALI SwitchDIM


Assembly springs for quick assembly without tools in ceilings 1 - 30 mm


Effective black lacquered cooling.

PLEIAD COMFORT G3

"The Pleiad family covers a wide range of LED downlights with different light distributions for various types of lighting tasks. The rapid installation, combined with high efficiency and long life makes Pleiad G3 a very economical choice with a beneficial pay-off time".

DESCRIPTION

Recessed mounting in unventilated or ventilated ceilings. Stable assembly springs included. An assembly plate must be used when mounting in soft tile ceilings. Snap-in terminal block 3 × 2.5 mm², through-wiring is possible. Alternative connection with cord and plug or snap-in connector. Luminaire body in black cast aluminium. Visible reflector ring in white PC plastic (RAL 9003).

Reflector in either specular or matt anodised aluminium. Bright metallised ring louvre above the LED module. LED module includes ballast and can easily be changed with a bayonet feature. The luminaire is equipped with dust protection in the light opening.

POWER SUPPLY

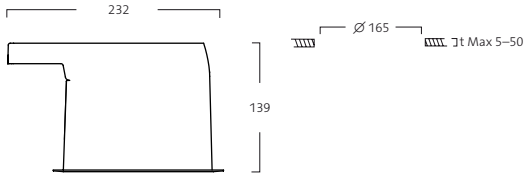
Operating voltage 230 V.

OTHER INFORMATION

Dimmable versions available upon request

Pleiad Comfort G3

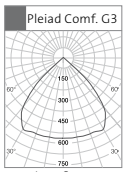
IP20



LED module	*lm*	*Colour temp*	*RA (CRI)*	*Specular reflector*	*Matt reflector*
16W	1100	3000	≥ 90	**77950**	**77951**
16W	1100	4200	≥ 90	**77952**	**77953**
30W	2000	3000	≥ 90	**77955**	**77956**
30W	2000	4200	≥ 90	**77957**	**77958**
30W	2000	2700-6500	≥ 90	**77975**	**77976**

Light source	*Ballast*
Light source incl.	Incl. LED Driver

Light data



Specular reflector


Effective glare control mounted to the reflector.


Assembly spring is released with a simple operation.

PLEIAD COMPACT G3

"The Pleiad family covers a wide range of LED downlights with different light distributions for various types of lighting tasks. The rapid installation, combined with high efficiency and long life makes Pleiad G3 a very economical choice with a beneficial pay-off time".

DESCRIPTION

Recessed mounting in unventilated or ventilated ceilings. Stable assembly springs included. An assembly plate must be used when mounting in soft tile ceilings. Snap-in terminal block 3 × 2.5 mm², through-wiring is possible. Alternative connection with cord and plug or snap-in connector. Luminaire body in black cast aluminium. Visible reflector ring in white PC plastic (RAL 9003).

Reflector in either specular or matt anodised aluminium. Bright metallised ring louvre above the LED module. LED module includes ballast and can easily be changed with a bayonet feature. The luminaire is equipped with dust protection in the light opening.

POWER SUPPLY

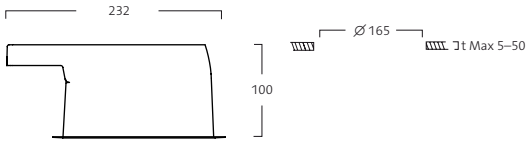
Operating voltage 230 V.

OTHER INFORMATION

Dimming versions available upon request

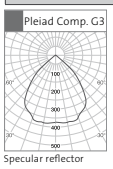
Pleiad Compact G3 Basic

IP20



LED module	*lm*	*Colour temp*	*RA (CRI)*	*Specular reflector*	*Matt reflector*
20W	1100	3000	≥ 80	**77880**	**77881**
18W	1100	4000	≥ 80	**77882**	**77883**
Light source				*Ballast*	
Light source incl.				Incl. LED Driver	

Light data



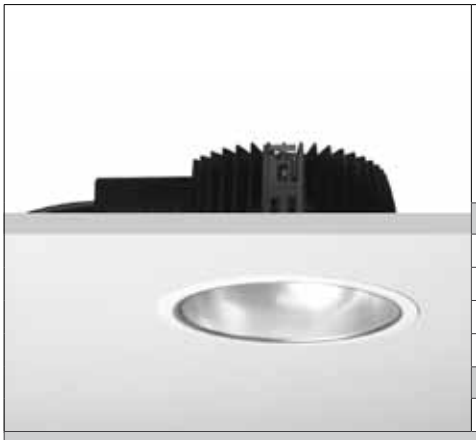
Specular reflector

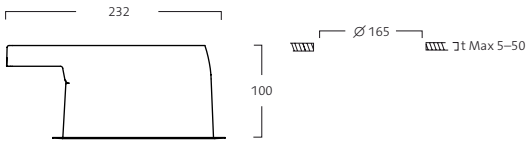

LED module includes ballast and can easily be changed using the bayonet socket.


Pleiad Compact Basic G3 can be supplied with snap-in connector.

Pleiad Compact G3

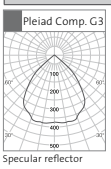
IP20





LED module	*lm*	*Colour temp*	*RA (CRI)*	*Specular reflector*	*Matt reflector*
16W	1100	3000	≥ 90	**77930**	**77931**
16W	1100	4200	≥ 90	**77932**	**77933**
30W	2000	3000	≥ 90	**77935**	**77936**
30W	2000	4200	≥ 90	**77937**	**77938**
Light source				*Ballast*	
Light source incl.				Incl. LED Driver	

Light data



Specular reflector


Assembly spring clamped in position.

Freedom

"Sketch your own lines with light! Freedom is an innovative LED luminaire that makes it possible to create free forms suspended in the air, on the ceiling and on the wall. With the help of two modules, one straight and one curved, the luminaire can be built up to follow the shape of the room or a creative concept. Offering architects, interior designers and lighting designers full freedom of expression."

DESIGNER

Weikko Kotila and Julle Oksanen

DESCRIPTION

For single or continuous installation via wire suspension, surface mounted or wall mounted via two securing holes in the profile. Power cable is connected to the luminaire at one end, the other end is connected to a box containing the LED ballasts and snap-in terminal block. *(The box with LED ballasts and snap-in terminal box are ordered separately).* Luminaire body in black anodised aluminium. Diffusers made from opal polyester, reflectors made from highly reflective polyester, end caps made from black ABS plastic. Transparent power cable. Installation box in white enamelled sheet-metal.

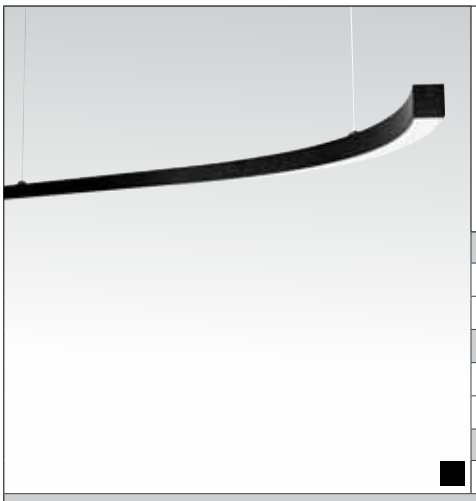
POWER SUPPLY

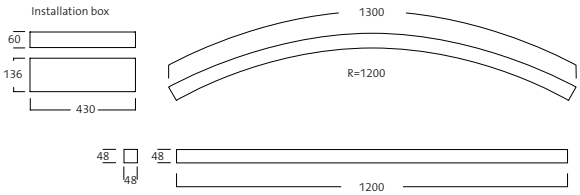
230V, 24 V.

OTHER INFORMATION

Dimming available on request.

Freedom Pendant and Ceiling

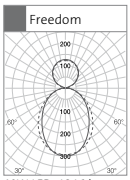




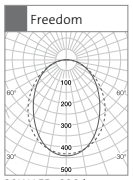
Freedom Straight, direct/indirect, pendant	*Weight*	*Art.no*
32W	**1,4 kg**	**16902**
40W	**1,5 kg**	**16901**
Freedom Curved, direct/indirect, pendant	*Weight*	*Art.no*
32W	**1,4 kg**	**16902**
40W	**1,6 kg**	**16903**

Light source	*Ballast*
Incl. Light source	LED ballast and snap-in terminal box ord. sep.

Light data



40W LED, 1216 lm

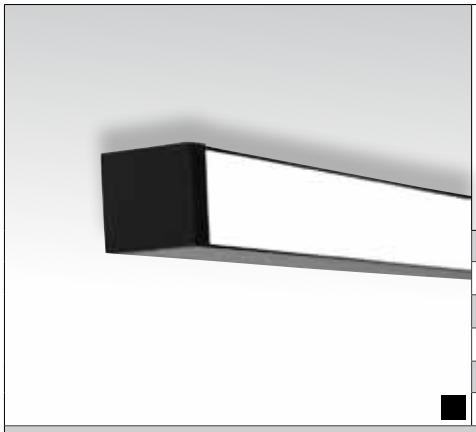


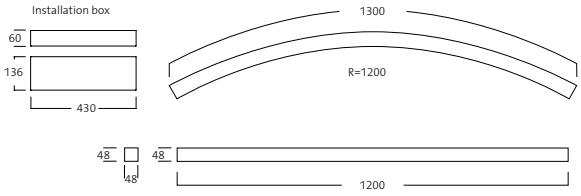
32W LED, 828 lm


Suspended direct/indirect luminaire incl. dust and contact protection.


A sharp contrast at the intersection between profile and diffuser produces a decorative feature.

Freedom Wall

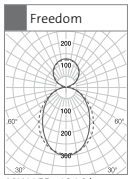




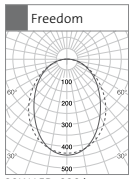
Freedom Straight, direct/indirect, pendent	*Weight*	*Art.no*
32W	**1,4 kg**	**16910**
Freedom Curved, direct/indirect, pendent	*Weight*	*Art.no*
32W	**1,5 kg**	**16911**

Light source	*Ballast*
Incl. Light source	LED ballast and snap-in terminal box ord. sep.

Light data



40W LED, 1216 lm

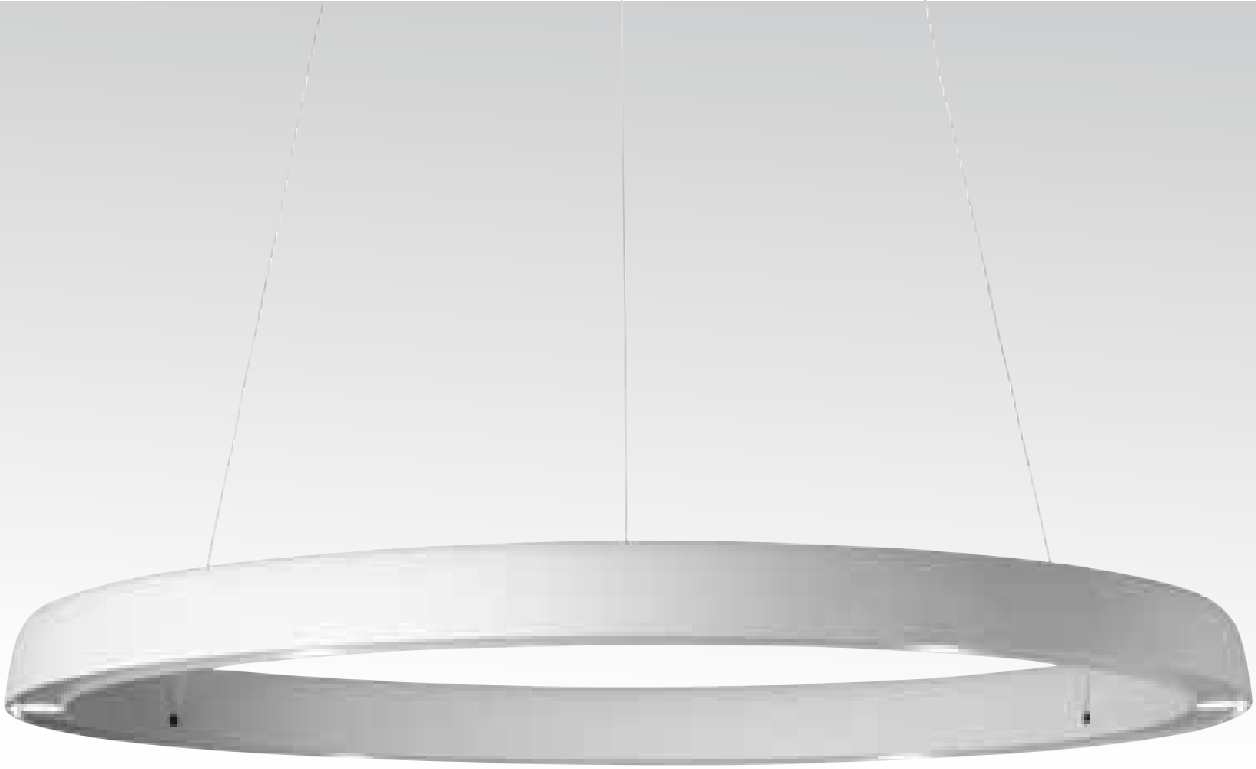


32W LED, 828 lm


In a continuous installation Freedom creates an unbroken line of light.


In a continuous installation Freedom creates an unbroken line of light.

Accessories	
Installation accessories	
94021	Wire and wire bracket for pendant installation (pair) *For pendant model*
94023	Continuous coupler bracket, light trap, cable for continuous installation
94022	Endcaps / pair
98011	LED ballasts 300 W/24 V fitted in the installation box. Max. 6 luminaires.
94024	Power cable 4m connection 2x conductors
94025	Power cable 4m connection 4x conductors



Gaudi

"With Gaudi new technology meets timeless elegance. A suspended luminaire inspired by classical architectural principles and developed based on LED technology; providing a unique opportunity to produce smaller luminaires than previously possible."

DESIGNER

Claesson Koivisto Rune

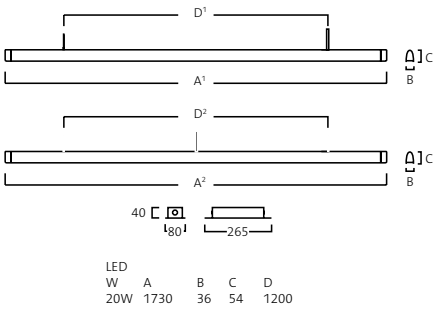
DESCRIPTION

Gaudi Linear: Wire suspended. Wire (1,5 m) and wire lock included. Body and cover in extruded aluminium. End caps in die cast aluminium. Diffusor in opal acrylic. 1,5m transparent chord and canopy with terminal block and driver included.
Gaudi Cirkular: Wire suspension 2,0m with ceiling cup and integrated friction lock for height adjustment. Body in spun aluminum, end caps in aluminum, ceiling cup in extruded aluminum. Fixture supplied with 3pcs 2,0m wire (two wires act as power supply). Ceiling cup with terminal block 5x2,5mm2. Driver included in the ceiling cup. Luminarie housing in white (RAL9016) or black (RAL9005).

POWER SUPPLY

230V

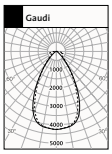
Gaudi Linear LED



LED
W A B C D
20W 1730 36 54 1200

LED	White	Black
20W	**54607**	**54608**
Weight	*Light source*	*Ballast*
2,2 kg	LED unit included	Driver included

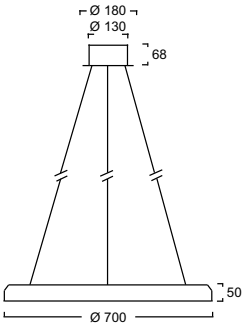
Light data



LED 20W, 475 lm

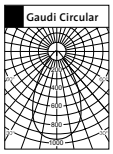
Standard light regulator via a discreet breaker.

Gaudi Circular LED



LED	White	Black
x 18	**54611**	**54612**
Weight	*Light source*	*Ballast*
2,4 kg	LED unit included	Driver included

Light data



The pendant length is adjusted via a wire lock in the ceiling cup.

Six high output LEDs with optics.

See prosper Suspended

"See Prosper is retail solutions first Fagerhult art of light product. See originated in a wish for moving away from the traditional suspended luminaire design and provide functional accent lighting in combination with creating an atmosphere. By allowing two different circles come together asymmetry meets harmony. The horizontally stretched outline makes room for technique beside the light source instead of above which is the conventional way of designing."

DESCRIPTION

Suspended luminaire for accent lighting. Architectural approach with asymmetrical yet balanced shape. Luminaire can be used as single or in clusters up to four units. Metal halide, LED and halogen light source options. Body in bent aluminium, top and bottom cover in die casted aluminium and light unit in milled aluminium.
Reflector: MT - High specular faceted aluminium reflector.
LED - Metalized polycarbonate reflector. HMG111 - Reflector included in the light source.
Colour setting in white (RAL 9010) and black (RAL 9005).

POWER SUPPLY

230V

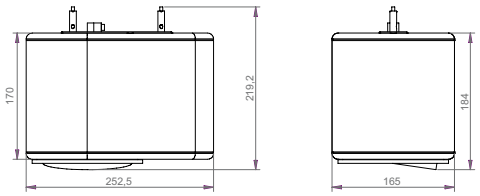
ACCESSORIES

Cluster frames for up to 4 See prosper light fixtures.

OTHER INFORMATION

Swivel 355° , Tilt 0 - 30°

See Prosper Suspended LED



LED 1000lm 18W, 3000K	*White*	*Black*
Narrow 21°	**59671**	**59672**
Medium 43°	**59619**	**59621**
Wide 59°	**59620**	**59622**
Weight	*Light source*	*Ballast*
2,89 Kg	LED unit included	Electronic Driver included

Light data

21° See Prosper

m	Ø	Lux
1,0	0,4	3195
2,0	0,8	799
3,0	1,1	355
4,0	1,5	200

LED 3000K

43° See Prosper

m	Ø	Lux
1,0	0,8	1607
2,0	1,6	402
3,0	2,4	179
4,0	3,1	100

LED 3000K

59° See Prosper

m	Ø	Lux
1,0	1,1	1050
2,0	2,3	263
3,0	3,4	117
4,0	4,5	66

LED 3000K

Accessories (Power cable and wire included in luminaire)	
Installation accessories	
91696	Wire suspension for T-bar and surface mounting / pair
96787	Wire bracket chrome (1 unit)
97001	Ceiling cup white
97002	Ceiling cup black

Wire suspension

Wire bracket

See Prosper Track

"See Prosper is retail solutions first art of light product. See originated in a wish for moving away from the traditional suspended luminaire design and provide functional accent lighting in combination with creating an atmosphere. By allowing two different circles come together asymmetry meets harmony. The horizontally stretched outline makes room for technique beside the light source instead of above which is the conventional way of designing."

DESCRIPTION

Track mounted luminaire for accent lighting. Architectural approach with asymmetrical yet balanced shape. Metal halide, LED and halogen light source options. Body in bent aluminium, top and bottom cover in die casted aluminium and light unit in milledaluminium. Reflector: MT - High specular faceted aluminium reflector.
LED - Metalized polycarbonate reflector. HMG111 - Reflector included in the light source.
Colour setting in white (RAL 9010) and black (RAL 9005).

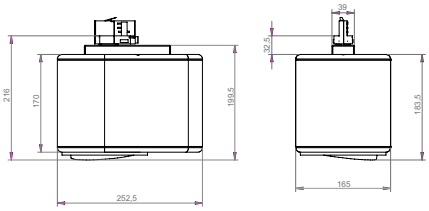
POWER SUPPLY

230V

OTHER INFORMATION

Swivel 355° , Tilt 0 - 30°

See Prosper Track LED



LED 1000lm 18W, 3000K	*White*	*Black*
Narrow 21°	**59673**	**59674**
Medium 43°	**59623**	**59625**
Wide 59°	**59624**	**59660**
Weight	*Light source*	*Ballast*
2,86 Kg	LED unit included	Electronic Driver included

Light data

21° See Prosper

m	∅	Lux
1,0	0,4	3195
2,0	0,8	799
3,0	1,1	355
4,0	1,5	200

LED 3000K

43° See Prosper

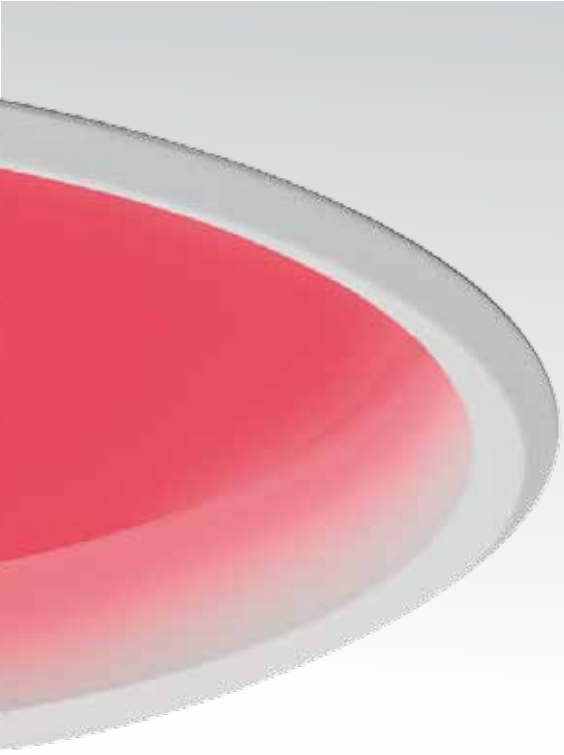
m	∅	Lux
1,0	0,8	1607
2,0	1,6	402
3,0	2,4	179
4,0	3,1	100

LED 3000K

59° See Prosper

m	∅	Lux
1,0	1,1	1050
2,0	2,3	263
3,0	3,4	117
4,0	4,5	66

LED 3000K



Pozzo LED RGB

"Pozzo is a luminaire that can be used to create different and interesting patterns in the ceiling. The diffuser can be positioned slightly recessed within the fitting, to create a 'light-well' effect, or aligned to the ceiling as a large area, round beam luminaire."

DESIGNER

Örjan Nilsson, T-GUL industrial design

DESCRIPTION

Luminaire housing of enamelled deep drawn aluminium. Diffuser of opalised acrylic. Recessed mounting in unventilated or ventilated ceilings. Fixing brackets included with the luminaire. Pozzo is delivered with a 2.5m mainscable with an earth plug. Luminaire for RGB has a separate connection for the coloured light. Luminaire housing in white (RAL 9003).

POWER SUPPLY

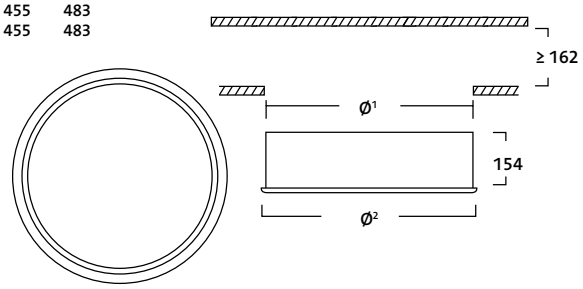
230V

OTHER INFORMATION

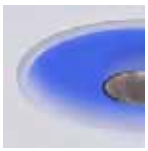
The luminaire`s opal shade is adjustable vertically - to create a light well in the uppermost position or an opal surface in the lowermost position.

Pozzo LED

W	Ø¹	Ø²
2x26 FCH LED	455	483
1x60 FCH LED	455	483



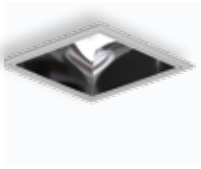
Pozzo LED	*Art. no.*	*Diameter mm*
1x60W + LED	**24797**	**450**
2x26W + LED	**24798**	**450**
Weight	*Light source*	*Ballast*
5 kg	LED unit included	Driver included



RGB allows setting of a specific colour, alternatively colour sequenses, controlled by DALI.

Accessories	
Installation accessories (An assembly plate should be used when installing in soft tile ceilings.	
94983	Pozzo mounting plate Ø450mm for 600-module
94984	Pozzo mounting plate Ø550mm for 600-module

Pleiad LED Downlight



"Pleiad LED is a discreet, energy efficient downlight. The colour temperature is regulated to either 3000K or 4000K with the LED system Fortimo. Choose either one, depending on the atmosphere you want to create."

DESCRIPTION

Recessed fixture for installation in ventilated or unventilated ceilings. Fixture delivered with 2.5m mainscable with earthed plug. Dimmable versions delivered with a 5-pole connector. Driver box preconnected to the fixture. Frame in die-cast aluminium, body in matt black aluminum. White - RAL 9003 black - RAL 9005. Reflector in specular metallised polycarbonate.

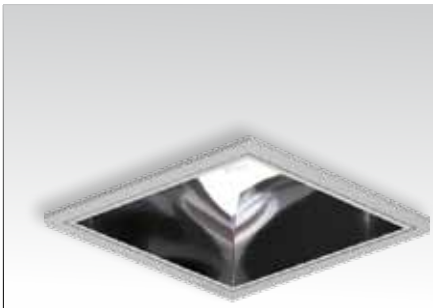
POWER SUPPLY

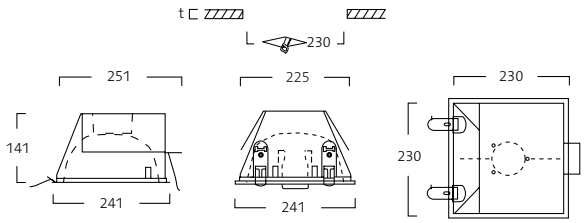
230V

OTHER INFORMATION

Dimmable version can be dimmed from 100-10%.

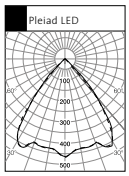
Pleiad LED downlight





Pleiad LED downlight	*Colour code*	*White*	*Black*
18W	3000 K	**77793**	**77802**
18W	4000 K	**77794**	**77803**
32W	4000 K	**77798**	**77807**
36W	3000 K	**77797**	**77806**
Pleiad LED downlight Dim	*Colour code*	*White*	*Black*
32W	4000 K	**77798-365**	**77807-365**
36W	3000 K	**77797-365**	**77806-365**
		Light source	*Ballast*
LED		LED unit included	LED driver included

Light data



Downlight

LED-system Fortimo with konstant colour temperature, 3000 K or 4000 K.

Accessories	
Installation accessories	
41957	Mounting plate
41953	Mounting plate with support channel 600mm
41954	Mounting plate with support channel 625mm

Pleiad LED Wallwasher

"Pleiad LED Wallwasher is a luminaire which complements other downlights to create a dynamic lighting environment. Use it to highlight textures and accentuate different products."

DESCRIPTION

Recessed fixture for installation in ventilated or unventilated ceilings. Fixture delivered with 2.5m mainscable with earthed plug, Dimmable versions delivered with a 5-pole connector. Driver box preconnected to the fixture. Frame in die-cast aluminium, body in matt black aluminum. White - RAL 9003. Black - RAL 9005. Reflector in specular metallised polycarbonate.

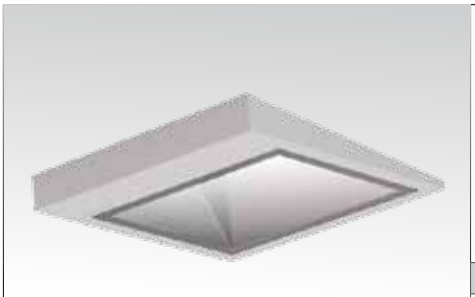
POWER SUPPLY

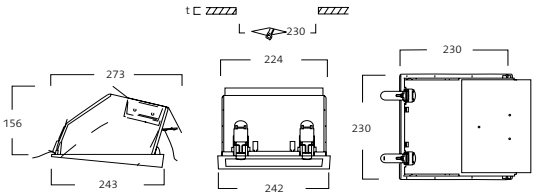
230V

OTHER INFORMATION

Via Philips Lexel unit the color temperature can be changed from 2700K to 6000K. Dimmable version can be dimmed from 100-10%.

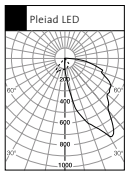
Pleiad LED Wallwasher





Pleiad LED wallwasher	*Colour code*	*White*	*Black*
18W	3000 K	**77790**	**77799**
18W	4000 K	**77791**	**77800**
36W	3000 K	**77795**	**77804**
36W	4000 K	**77796**	**77805**
Pleiad LED wallwasher Dim	*Colour code*	*White*	*Black*
36W	3000 K	**77795-365**	**77804-365**
36W	4000 K	**77796-365**	**77805-365**
40W	2700-6500K	**77792**	**77801**
		Light source	*Ballast*
LED		LED unit included	LED driver included

Light data



Wallwasher

Due to the Lexel-system the colour temperature can be adjusted.

Accessories	
Installation accessories	
41957	Mounting plate
41953	Mounting plate with support channel 600mm
41954	Mounting plate with support channel 625mm

Do LED

"Do discreetly integrated in the ceiling with a variety of solutions for the perfect visual comfort, all of this incorporated in an elegant thin and slim trim in perfect overflow with its surroundings."

DESIGNER

WACO design, Johan Lemaitre

DESCRIPTION

Do LED is a series of round aluminium recessed downlights. The fixed Dov, Dox and Doy and the directional Dor all have the same recess diameter. Do LED is equipped with an LED engine in 3000K or 4000K in a spot version of 17° or a flood version of 54°. The range comes in black, white, grey and brushed aluminium.

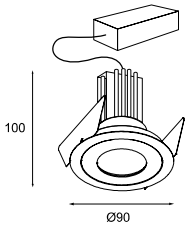
POWER SUPPLY

230V

OTHER INFORMATION

Standard accessories available: caps, honeycomb louvre, basslum. Also available in halogen 12v or 230v downlights.

Dov LED

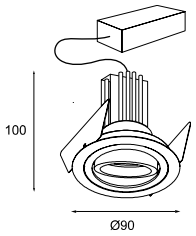


LED 7W	Kelvin	Lumen	White	Grey	Black	Brushed alum.
Narrow 17°	3000K	470lm	**402.11.2.03.2**	**402.11.2.05.2**	**402.11.2.01.2**	**402.11.2.30.2**
	4000K	530lm	**402.11.3.03.2**	**402.11.3.05.2**	**402.11.3.01.2**	**402.11.3.30.2**
Wide 54°	3000K	475lm	**402.11.2.03.4**	**402.11.2.05.4**	**402.11.2.01.4**	**402.11.2.30.4**
	4000K	510lm	**402.11.3.03.4**	**402.11.3.05.4**	**402.11.3.01.4**	**402.11.3.30.4**

Weight		Light source	Ballast
0,28 kg	230V-350mA	Incl. Lightsource	Ballast 1-10V DIMM incl.

SEE LIGHT DATA FOR THESE PRODUCTS ON PAGE 42 >>

Dor LED

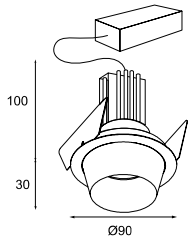


LED 7W	Kelvin	Lumen	White	Grey	Black	Brushed alum.
Narrow 17°	3000K	470lm	**402.03.2.03.2**	**402.03.2.05.2**	**402.03.2.01.2**	**402.03.2.30.2**
	4000K	530lm	**402.03.3.03.2**	**402.03.3.05.2**	**402.03.3.01.2**	**402.03.3.30.2**
Wide 54°	3000K	475lm	**402.03.2.03.4**	**402.03.2.05.4**	**402.03.2.01.4**	**402.03.2.30.4**
	4000K	510lm	**402.03.3.03.4**	**402.03.3.05.4**	**402.03.3.01.4**	**402.03.3.30.4**

Weight		Light source	Ballast
0,28 kg	230V-350mA	Incl. Lightsource	Ballast 1-10V DIMM incl.

SEE LIGHT DATA FOR THESE PRODUCTS ON PAGE 42 >>

Dox LED

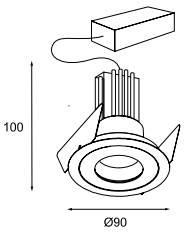


LED 7W	Kelvin	Lumen	White	Grey	Black	Brushed alum.
Narrow 17°	3000K	470lm	**402.13.2.03.2**	**402.13.2.05.2**	**402.13.2.01.2**	**402.13.2.30.2**
	4000K	530lm	**402.13.3.03.2**	**402.13.3.05.2**	**402.13.3.01.2**	**402.13.3.30.2**
Wide 54°	3000K	475lm	**402.13.2.03.4**	**402.13.2.05.4**	**402.13.2.01.4**	**402.13.2.30.4**
	4000K	510lm	**402.13.3.03.4**	**402.13.3.05.4**	**402.13.3.01.4**	**402.13.3.30.4**

Weight		Light source	Ballast
0,34 kg	230V-350mA	Incl. Lightsource	Ballast 1-10V DIMM incl.

SEE LIGHT DATA FOR THESE PRODUCTS ON PAGE 42 >>

Doy LED



LED 7W	Kelvin	Lumen	White	Grey	Black	Brushed alum.
Narrow 17°	3000K	470lm	**402.14.2.03.2**	**402.14.2.05.2**	**402.14.2.01.2**	**402.14.2.30.2**
	4000K	530lm	**402.14.3.03.2**	**402.14.3.05.2**	**402.14.3.01.2**	**402.14.3.30.2**
Wide 54°	3000K	475lm	**402.14.2.03.4**	**402.14.2.05.4**	**402.14.2.01.4**	**402.14.2.30.4**
	4000K	510lm	**402.14.3.03.4**	**402.14.3.05.4**	**402.14.3.01.4**	**402.14.3.30.4**

Weight	Light source	Ballast
0,34 kg	230V-350mA	Incl. Lightsource	Ballast 1-10V DIMM incl.

Light data

17° DO

m	Ø	Lux
1,0	0,3	4389
2,0	0,6	1097
3,0	0,8	488
4,0	1,1	274

LED 7W 3000K

54° DO

m	Ø	Lux
1,0	1,1	499
2,0	2,2	125
3,0	3,3	55
4,0	4,3	31

LED 7W 3000K

17° DO

m	Ø	Lux
1,0	0,3	4726
2,0	0,5	1182
3,0	0,8	525
4,0	1,1	295

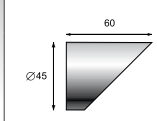
LED 7W 4000K

54° DO

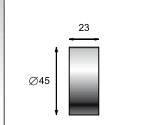
m	Ø	Lux
1,0	1,1	519
2,0	2,2	130
3,0	3,4	58
4,0	4,5	32

LED 7W 4000K

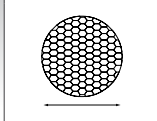
Optional accessories for Dov and Dor LED



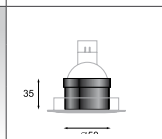
CAP 45°	
White	**402.06.0.03.0**
Grey	**402.06.0.05.0**
Black	**402.06.0.01.0**
Bruched Alu	**402.06.0.30.0**



CAP	
White	**402.05.0.03.0**
Grey	**402.05.0.05.0**
Black	**402.05.0.01.0**
Bruched Alu	**402.05.0.30.0**



Louvre	
	201.13.0.00.0



Basslum	
White	**402.07.0.03.0**
Grey	**402.07.0.05.0**
Black	**402.07.0.01.0**

Noc LED

" Elegant curves adorn the ceiling like a stratocumuli, where the sun pierces through gracefully bringing the light where it is desired."

DESIGNER

WACO design, Johan Lemaitre

DESCRIPTION

The Noc LED family is a part of the larger Noc multisource range and is available in single, double or triple lamp configurations. Due to the snap-in light units Noc also offers the possibility to mix colours of frame and light unit. Standard colours are grey, white, black and brushed anodised. There are two output/CRI versions: 400lm/700lm with CRI > 90 and 580lm/1000lm with CRI > 80. All available in 2700K, 3000K or 4000K and in 3 beam angles: 20°, 40° and 60°.

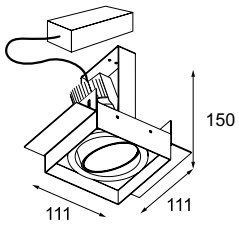
POWER SUPPLY

230V

OTHER INFORMATION

Switchable gear for 400lm/700lm or 580lm/1000lm output included.

Noc LED



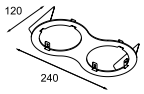
DIP LED	Lm		White	Grey	Black	Brushed Anodised
Narrow	400/ 700	Frame	**490.02.0.03.1**	**490.02.0.05.1**	**690.02.0.01.1**	**490.02.0.20.1**
		Light unit	**491.02.KE.03.1**	**491.02.KE.05.1**	**491.02.KE.01.1**	**491.02.KE.20.1**
Medium	400/ 700	Frame	**490.02.0.03.1**	**490.02.0.05.1**	**690.02.0.01.1**	**490.02.0.20.1**
		Light unit	**491.02.KE.03.2**	**491.02.KE.05.2**	**491.02.KE.01.2**	**491.02.KE.20.2**
Wide	400/ 700	Frame	**490.02.0.03.1**	**490.02.0.05.1**	**690.02.0.01.1**	**490.02.0.20.1**
		Light unit	**491.02.KE.03.3**	**491.02.KE.05.3**	**491.02.KE.05.3**	**491.02.KE.20.3**
Frame and light unit are individual articles that need to be ordered together						

Weight	*Light source*	*Ballast*
0,7 kg	230V-ECG	LED unit incl. 3000K	Control gear included

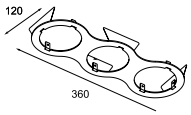
Accessories	
Installation accessories for NOC 70 LED	
823.02.1.02.0	Soft tile mounting plate (one plate/light unit is necessary)
41393	Soft tile mounting plate support 600mm

Configurator

NOC FRAME 70/1
490.02.0.03.1
490.02.0.05.1
490.02.0.01.1
490.02.0.20.1

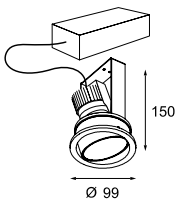


NOC FRAME 70/2
490.02.0.03.2
490.02.0.05.2
490.02.0.01.2
490.02.0.20.2



NOC FRAME 70/3
490.02.0.03.3
490.02.0.05.3
490.02.0.01.3
490.02.0.20.3

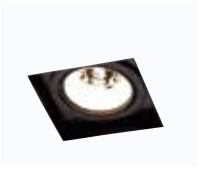
NOC LED light fixtue



20°		40°		60°	
	491.02._.03.1		491.02._.03.2		491.02._.03.3
	491.02._.05.1		491.02._.05.2		491.02._.05.3
	491.02._.01.1		491.02._.01.2		491.02._.01.3
	491.02._.20.1		491.02._.20.2		491.02._.20.3

Select souce			
LED 2700K	KD	580lm / 1000lm	H 355° - V 2x20°
	230V ~ ECG	11W / 23W	CRI > 80
	GEAR INCL.	350mA / 700mA	H=150
LED 3000K	KE	580lm / 1000lm	H 355° - V 2x20°
	230V ~ ECG	11W / 23W	CRI > 80
	GEAR INCL.	350mA / 700mA	H=150
LED 4000K	KF	580lm / 1000lm	H 355° - V 2x20°
	230V ~ ECG	11W / 23W	CRI > 80
	GEAR INCL.	350mA / 700mA	H=150

Dip 70 LED



"State of the art discreetness integrating itself flawlessly in the purest of architectural projects. Reserved and humble, yet with the determination bringing targeted objects to life."

DESIGNER

WACO design, Johan Lemaitre

DESCRIPTION

The Dip family, a range of trimless recessed fixtures with a shallow look, includes this sub-family of LED applications in either a single, double or triple lamp configuration. Standard colours are black, white and grey. There are two output/CRI versions: 400lm/700lm with CRI > 90 and 580lm/1000lm with CRI > 80. All available in 2700K, 3000K or 4000K and in 3 beam angles: 20°, 40° and 60°.

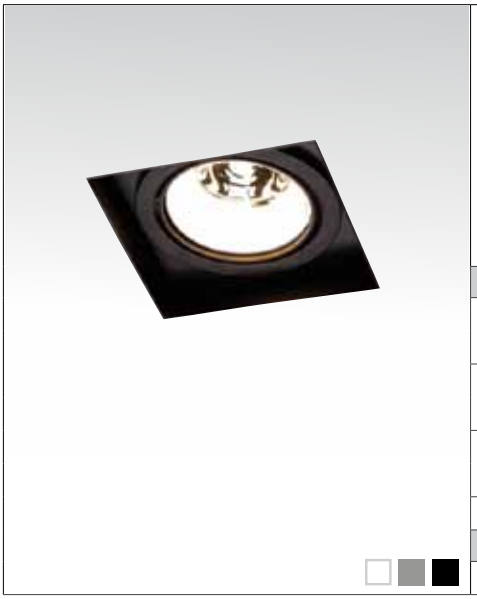
POWER SUPPLY

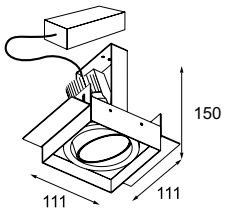
230V

OTHER INFORMATION

Switchable gear for 400lm/700lm or 580lm/1000lm output included.

Dip 70 LED



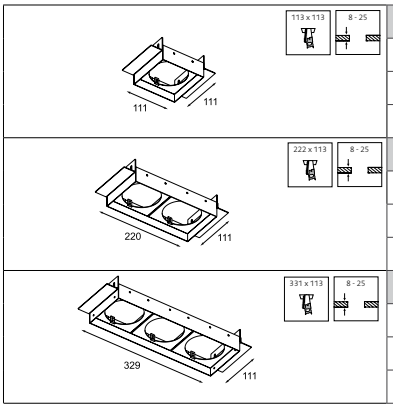


DIP LED	Kelvin		White	Grey	Black
Narrow	3000K	Frame	**690.02.0.03.1**	**690.02.0.05.1**	**690.02.0.01.1**
		Light unit	**491.02.KE.03.1**	**491.02.KE.05.1**	**491.02.KE.01.1**
Medium	3000K	Frame	**690.02.0.03.1**	**690.02.0.05.1**	**690.02.0.01.1**
		Light unit	**491.02.KE.03.2**	**491.02.KE.05.2**	**491.02.KE.01.2**
Wide	3000K	Frame	**690.02.0.03.1**	**690.02.0.05.1**	**690.02.0.01.1**
		Light unit	**491.02.KE.03.3**	**491.02.KE.05.3**	**491.02.KE.01.3**

Frame and light unit are individual articles that need to be ordered together

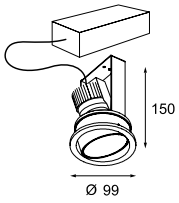
Weight		Light source	Ballast
2,1 kg	230V-ECG	LED unit incl. 3000K	Control gear included

Configurator

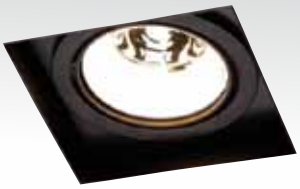


DIP FRAME 70/1
☐ 690.02.0.03.1
▒ 690.02.0.05.1
■ 690.02.0.01.1
DIP FRAME 70/2
☐ 690.02.0.03.2
▒ 690.02.0.05.2
■ 690.02.0.01.2
DIP FRAME 70/3
☐ 690.02.0.03.3
▒ 690.02.0.05.3
■ 690.02.0.01.3

DIP LED light fixtue



20°		40°		60°	
☐	491.02._.03.1	☐	491.02._.03.2	☐	491.02._.03.3
▒	491.02._.05.1	▒	491.02._.05.2	▒	491.02._.05.3
■	491.02._.01.1	■	491.02._.01.2	■	491.02._.01.3



Select souce			
LED 2700K	KD	580lm / 1000lm	H 355° - V 2x20°
	230V ~ ECG	11W / 23W	CRI > 80
	GEAR INCL.	350mA / 700mA	H=150
LED 3000K	KE	580lm / 1000lm	H 355° - V 2x20°
	230V ~ ECG	11W / 23W	CRI > 80
	GEAR INCL.	350mA / 700mA	H=150
LED 4000K	KF	580lm / 1000lm	H 355° - V 2x20°
	230V ~ ECG	11W / 23W	CRI > 80
	GEAR INCL.	350mA / 700mA	H=150

THE DEVELOPMENT HAS BEEN RAPID for the LED light source - which many consider to be the future of lighting. It is now on everybody's lips; claimed to be energy efficient, environmental-friendly and long-lived. With traits like this it is no wonder it is a popular object for any lighting installer.

But what is it really? Is it delivering on its promise? And how can it best be used in retail stores? What is the return on investment?

We hope that we can anwer some of these questions about LED and how it can be implemented in retail lighting.

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