The new fast-track to growth

Philips GreenPower LED toplighting

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Philips GreenPower
LED toplighting

Increase yield, optimize quality, and reduce costs

Philips is introducing a new LED solution for greenhouses called GreenPower LED toplighting. It can be used either as a direct replacement for traditional lighting systems or as an energy-efficient supplement. Perhaps even more importantly, growers who were previously unable to use lighting in their greenhouse can now take full advantage.

LED toplighting can even be used in greenhouses not suited to conventional lighting, thanks to the significantly lower heat radiation.

- Proven recipes for different crops
- Proven for different growth characteristics
- Less heat radiation
- Ideal for low greenhouses
- Easy-to-install
- Energy savings

GreenPower LED toplighting offers all the proven benefits of LED technology and – as a complete solution – much more besides. For example, Philips offers growers extensive support in the form of calculations and lighting plans by technical experts, and cultivation advice from in-house plant specialists.

Philips also offers a choice of dedicated 'light recipes' – different combinations of spectrum, intensity, moment of lighting, uniformity and positioning – that Philips has developed over many years of cooperation with growers, universities, and research sites to optimize growth. These make it possible to steer specific plant characteristics such as compactness, colorintensity branch development, flower stimulation, and more.

For every **greenhouse**

Philips GreenPower LED toplighting is the next step in the development and application of dedicated light recipes to increase production and improve crop quality. With this introduction year round production is in reach for every greenhouse grower. LED toplighting offers light levels typically ranging from 40-300 µmol/m²/s in a highly efficient way. Philips GreenPower LED toplighting can be used either as a direct replacement for traditional lighting systems or as an energy-efficient supplement. Perhaps even more importantly, growers who were previously unable to use lighting in their greenhouse can now take full advantage: even growers with low greenhouse ceilings can now enjoy the proven benefits of LED toplighting.

LED toplighting offers the following key benefits:

Less heat radiation

LED lighting produces significantly less heat than conventional HPS lamps, so you can control your greenhouse climate more accurately. The convection heat that is still being produced can often help to save on your gas bill. Less heat also means you can use light more effectively, for example by increasing light levels, extending lighting periods, or by using light on warmer days without having to ventilate. Less heat also means you can place the light source closer to your plants, reducing light loss – so close in fact that you can now use toplighting even in low-ceiling greenhouses.

Spectral versions

LED technology makes it possible to optimize the light spectrum in order to stimulate photosynthesis and growth in an effective way, and/or to steer plant development and morphology. Five spectral versions have currently been developed based upon years of experience. The types with white light present in the module are convenient if working light is needed.

Flexibility and focus

Philips GreenPower LED toplighting comes in linear modules in order to ensure maximum flexibility in designing light plans with various light levels and high uniformity in combination with ease of installation and low light interception. The modules' compatibility with the C-profile (reducing light interception) and the option of easily creating head-to-tail continuous lines, or discontinuous lines of modules with cables in between, make the system highly flexible and suitable for many greenhouse situations. It is also possible to make combinations with existing HPS installations or to combine various spectral versions in one line.

LED technology enables a uniform and targeted light distribution, thereby minimizing expensive light losses. And as LED lighting does not require any heat-up time, you are free to initiate different lighting strategies at any time. Also, unlike other LED toplighting systems, Greenpower LED toplighting is air-cooled in a passive way, so no investment in water supply and drainage is required, as with water-based cooling.

Longer lifetime

LED solutions last much longer than conventional light sources – up to five times as long, so you will spend a lot less time and money replacing them.

Less energy

LED toplighting uses significantly less energy than HPS systems, saving up to 20-46% at comparable grow light levels (µmol/J).

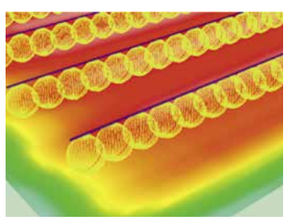


Figure 1
Line formation

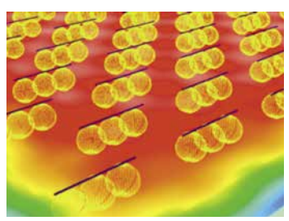


Figure 2
Short line/checkerboard formation

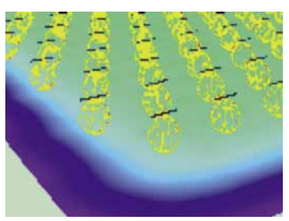
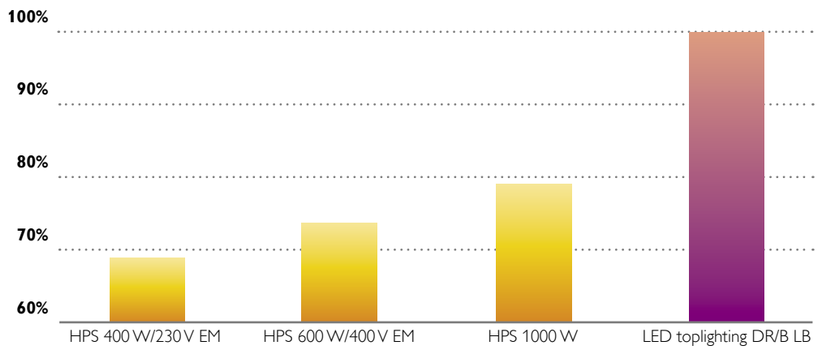


Figure 3
Checkerboard formation

Efficiency of LED toplighting system vs HPS systems



Calculations are based on an installation with the same light level, assuming typical light losses for luminaire, gear and reflection in a greenhouse.

Applications

Benefits of GreenPower LED toplighting in various segments

Most greenhouse growers can increase yield, optimize plant quality and reduce energy costs by replacing or supplementing their existing lighting with a GreenPower LED toplighting solution. And because LED lamps produce very little heat in comparison to HPS lamps and so do not damage the plants, even growers with low greenhouse ceilings can now enjoy the proven benefits of toplighting.

Growers of high-wire vegetables like tomato and cucumber

Year-round production, flexibility in use, efficient production, good quality

High-wire vegetables like tomato and cucumber need light for year-round production in the most efficient way. The surplus of heat produced by traditional light sources like HPS is often a restricting factor for using (higher levels of) grow light in a greenhouse. With GreenPower LED toplighting this is now an option, giving you more flexibility to light at times of higher outside temperatures.

Strawberry growers

Early or year-round production, better-quality fruit

The strawberry production period can be extended to as much as year-round by providing the right amount of light and the right temperatures. GreenPower LED toplighting has the benefit of delivering efficient light while not creating the heat load that could lead to lower-quality fruit.

Propagators

Uniform and controllable production to realize the desired plant architecture

GreenPower LED toplighting enables a very uniform light and heat distribution, resulting in uniform production. The various spectral versions help to grow the plant architecture you want, e.g. for the rooting of young floriculture material in an efficient way.

Cut flower growers

Highly efficient production, good-quality flowers

In the case of cut flowers, length, weight, vase life, flower color and uniformity are important quality and production factors. All of these factors can be influenced by the light recipe, often in combination with other climate factors. Optimizing these in combination with effective use of light will boost profitability for growers of crops like chrysanthemums, alstroemeria, gerbera and roses.

Growers of leafy vegetables and herbs

Tasty vegetables and herbs grown efficiently

Leafy vegetables are often grown at relatively cold temperatures, but they grow very well under light. The growing systems for leafy vegetables vary and therefore the light recipes can be optimized in different ways, adapted to cultivation method, climate and cultivars. Various light recipes are available to ensure optimal results in each situation: 100% LED or in combination with high-pressure sodium in cold countries; one spectral recipe for a whole cultivation period; or combinations of spectra and light sources during different stages of the production cycle.

Potted plant growers

Beautifully shaped plants with good leaf and flower color

Along with ornamental value, growth speed is the most important factor for potted plant growers. Considerable energy is devoted to optimizing growth speed via climate and growth regulators. Light is another tool that can strongly influence growth, and it can be very effective when applied in the right way. The spectral versions of GreenPower LED toplighting offer the option to go for more compact growth (and possibly use less growth regulator) but also to choose the most efficient growth. LED's lack of heat radiation enables better control of the plant temperature, preventing stress and damage to leaves and making it possible to apply higher light levels (e.g. for phalaenopsis, anthurium).

More information about GreenPower LED toplighting recipes

As well as the above-mentioned greenhouse crop segments there are many other types of crops and growth situations where GreenPower LED toplighting could be used for the light recipe. Please contact your local Philips Horti contact person or Philips LED horti partner for support.

Specification
GreenPower LED toplighting

The GreenPower LED toplighting offers a combination of carefully selected best-in-class technologies developed to serve grower's needs.

Efficiency and efficacy

The integrated electronic LED driver has a superior efficiency, thereby limiting total heat production and thus increasing the amount of photon flux per watt of input power. The thermal design to extract the heat from the LEDs has also been optimized for guaranteed long lifetime and minimal light output depreciation. The LEDs themselves offer the highest performance available at the market, and the optical design of the module ensures that almost none of the light is lost. All these factors combined offer a system efficacy of typically 2.3 µmol/J.

Light output over lifetime

When switching to LED it is important to know what the percentage light output is after the stated lifetime. The rated lifetime as listed in the table below indicates 25,000 hours. This means that after 25,000 hours the light output is still 90% of the initial value. After this rated lifetime the module is still functioning properly, and light output depreciation will continue in a similar trend.

Integrated driver

Integrating the driver also saves a lot of installation hassle; the module can be plugged to the 400 VAC mains grid and be used right away. The shape of the module has been chosen to match standard 40x40 mm C-profiles: with the accompanying brackets, installing a module is a matter of seconds. Installation time is further reduced by wiring the mains wires through the module, allowing for cable-free installation.
Thanks to the integrated connector in the end-cap the modules can be simply interconnected by installing them head-to-tail without having to worry about the electrical interconnections. Furthermore, the system is not only rated IP66, but the sealing is also implemented in a robust way, which not only allows easy cleaning with pressurized water but also guarantees reliable operation in humid environments (RV <95%).

Linear approach

The linear approach of the toplighting system also ensures:

- minimal daylight interception
- optimal heat transfer from the module to the surroundings
- high uniformity of light on the crop when using continuous lines (head-to-tail).

Philips GreenPower LED toplighting	Photon flux * / **	Power consumption (typical) **	Lifetime *	Ingress protection rating	Power factor	Input voltage
	µmol/s	W	hrs		cos ϕ	VAC
Deep red/blue (DR/B)						
GreenPower LED toplighting module DR/B LB 400V	440	190	25,000	IP66	0.95	400
GreenPower LED toplighting module DR/B MB 400V	440	195	25,000	IP66	0.95	400
GreenPower LED toplighting module DR/B HB 400V	440	200	25,000	IP66	0.95	400
Deep red/white (DR/W)						
GreenPower LED toplighting module DR/W LB 400V	440	195	25,000	IP66	0.95	400
GreenPower LED toplighting module DR/W MB 400V	440	200	25,000	IP66	0.95	400

* Lifetime is given at an ambient temperature of 25 °C rated life to 90% of initial photon flux = 25 khrs.

** Photon flux and Power consumption values are typical at stable operation at an ambient temperature of 25 °C.

Ordering information
GreenPower LED toplighting

The unique GreenPower LED toplighting product range has been fully released in accordance with all safety regulations and has been tested against IEC 60598 by a certified approbation body (Dekra).

Philips has designed several types according to a best practice recipe. This is the outcome of a number of tests and studies with LEDs we have carried out in recent years in conjunction with universities and growers.

Product name	Ordering code 12NC
GreenPower LED toplighting module DR/B LB 400V	9290 008 82206
GreenPower LED toplighting module DR/B MB 400V	9290 008 82106
GreenPower LED toplighting module DR/B HB 400V	9290 008 82006
GreenPower LED toplighting module DR/W LB 400V	9290 008 81906
GreenPower LED toplighting module DR/W MB 400V	9290 008 85106
Accessories	
GreenPower LED toplighting mounting bracket (continuous line) [1]	9290 009 15106
GreenPower LED toplighting mounting bracket (non-continuous line)	9290 009 15206
GreenPower LED toplighting jumper cable (1,0 mtr) [2]	9290 009 15306
GreenPower LED toplighting jumper cable (2,0 mtr) [2]	9290 009 16006
GreenPower LED toplighting female connector	9290 009 15506
GreenPower LED toplighting end cap [3]	9290 009 15606

1) Stainless steel ø2.0 mm wire clip including 'locking plate' to fix the modules in an axial direction to prevent the modules working loose as a result of vibrations

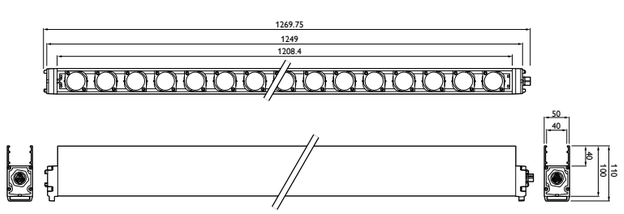
2) 3 x 1.5 mm² conductors, 2-sided 'male / female connector

3) To ensure IP66 rating for every single mounted or last module in a continuous line!

The accessories will be determined per project. This is due to the fact that it depends on the lighting design required for your crop. The local Philips sales representative will be able to advise you on this.

Dimensions GreenPower LED toplighting

Product	Dimensions (in mm)		
	Length	Width	Height
GreenPower LED toplighting module	1269.75	50	110
GreenPower LED toplighting module mounting bracket (continuous line)	118	85	47.5
GreenPower LED toplighting module mounting bracket (non-continuous line)	102	55	35.7



GreenPower LED toplighting module mounting bracket (continuous line)

GreenPower LED toplighting module mounting bracket (non-continuous line)

GreenPower LED toplighting solution
The new fast-track to growth

Philips' new GreenPower LED toplighting offers all the proven benefits of LED technology and – as a complete solution – much more besides.

- Quick and easy installation
- Choice of light recipes
- Advice on which lighting strategies are best for your situation.

For more information about Philips Horticulture LED Solutions visit:
www.philips.com/horti

Send us an e-mail:
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Document order number: 3222 635 69435
07/2014
Data subject to change.

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