EconoLux Industries Limited - 宜諾科技有限公司

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ELPL PRO-LED Series Grow Light Catalogue

Q4 - 2016

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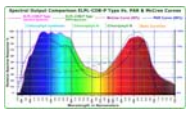
ELPLPRP-LED Series Grow Light Catalogue

Introduction

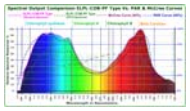
The ELPL PRO-LED series of Plant/Grow-lights is designed to meet the often harsh conditions found in professional greenhouses and licensed grow-ops. They feature:

- **IP-65 rated** - waterproof so they can resist the high humidity found in greenhouses;
- **Passive Cooling** - Low maintenances as there are no fans to repair/replace, and they can be cleaned as needed with a water hose;
- **Long Lifespan** - 50,000 Hours rated lifespan (that's 11.4 years at 12 hours usage per day) - we recommend replacing them after 40,000 hours to keep light levels high (that's 9.1 years at 12 hours usage per day).
- **Universal Voltage Input:** Standard models are 100~250VAC 50/60 Hz power input - other voltages optionally available;
- **Custom Optics:** Standard models have 45 degree lenses to concentrate light onto the plants - 60, 90 and 120 degree lenses optionally available.

The PRO-LED series is based on our exceptional COB (Chip On Board) LED Light-engines which are a world's first, cutting edge, innovation. With a previously unheard of 24 bands (wavelengths) of LEDs, they provides a very close match (90% ~ 95%) to the PAR curve! They are presently available in two types:



- **ELPL-COB-P** - A 90% match to the PAR curve, with more blue than red light, for leafy green plants and vegetative stage growing,



- **ELPL-COB-PF** - A 95% match to the PAR curve, with extra red light, for flowering or fruiting plants

These COBs provide the closest match to the PAR curve available anywhere in the world, and offer high PPFD.

Plant/Grow Light Measurements Quick Review

The unit of measurement for plant/grow light output is **PAR** (Photosynthetically Active Radiation). PAR is measured using a quantum flux meter (see examples photo), which has a response curve between 400nm and 700nm, and is a measure of the Micromoles per square meter, per second falling on the plants (µmol/M²/S).

When it comes to measuring the overall intensity of the light falling onto the plants, the unit of measurement is **PPFD** (Photosynthetic Photon Flux Density), also measured in Micromoles per square meter per second (µmol/M²/S). This is an important measurement as it allows one to calculate the overall efficiency of a plant/grow light in **PPFD/Watt**.

Another important, but less used, measurement is the Daily Light Integral (**DLI**). The DLI is defined as the amount of PAR (PPFD) received by plants each day as a function of light intensity (instantaneous light: µmol/m²/s-1) and duration (day). It is expressed as moles of light (mol) per square meter (m-2) per day (d-1), or: mol/m²/d-1 (moles per day).

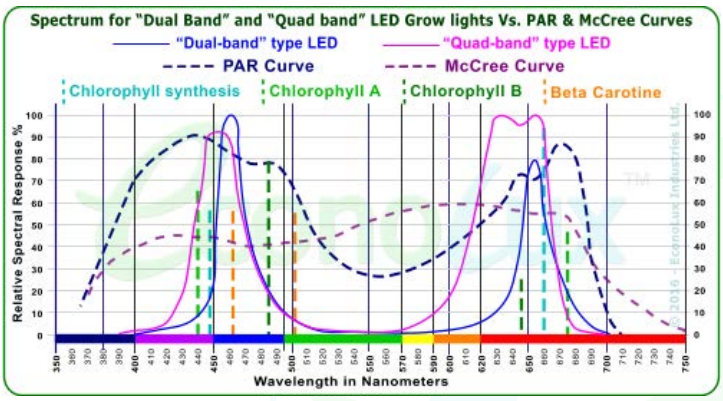
Lumens are for humans, PAR/PPFD are for plants!

Competing LED Plant Growing Light Spectra

LED grow lights have become increasingly popular as the cost of LEDs have dropped. In addition, they use far less energy for the same PPFD output, than conventional HID grow lights, and they also have a longer lifespan, saving on maintenance and re-lamping costs.

The following is a set of graphs of typical grow LED grow lights where the PAR and McCree curves have been overlaid on some samples of LED grow light spectra (from manufacturers data sheets). The PAR and McCree curves have been scaled to match the peak of the plant light output in the blue region for the PAR curve, and in the orange region for the McCree curve.

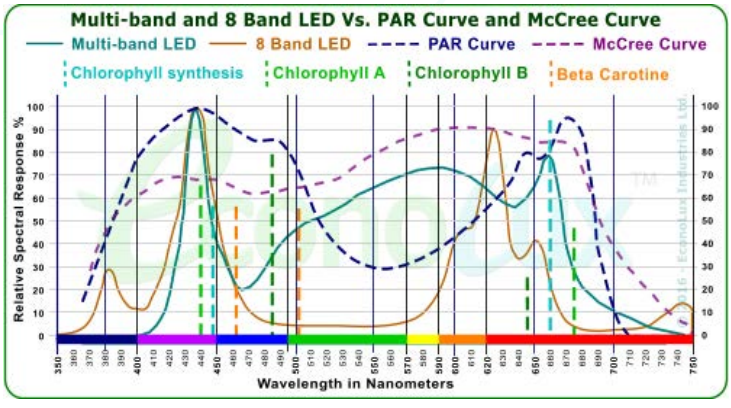
LED Grow lights are usually classified by "bands", that is the number of different wavelengths of LEDs that are used in the grow light. The simplest and cheapest types may have only 2 bands (2 different wavelengths, one red and one blue), or 4 bands (2 different wavelengths of blue, and 2 different wavelengths of red LEDs). Adding different wavelengths of blue and red LEDs, allows for a broader peak of light in each of the blue and red areas.



You can see from the graph (left) that the output of these example LED grow lights is actually a pair of spikes in the blue and red regions of the spectrum, with the quad (4 band) type having broader output spikes. There is almost no light at all in the 500nm to 580nm green to yellow portion of the spectrum, which is necessary (especially if one is considering the McCree curve). The dual band type's light output in the red barely covers the chlorophyll synthesis line at 660nm. These LED grow lights do not have a close match to the PAR, or the McCree, curves, and thus will not produce good results.

In all fairness to vendors, more advanced LED grow lights with 6, 8, or even 10 bands are now on the market. The more different bands (wavelengths) of LEDs that are used, the higher the cost to produce the light, thus many of these multi-band LED grow lights are found in the high end consumer or professional market. Here is a comparison graph (below) of a Multi-band (the exact number was not specified by the manufacturer), and an 8 band LED grow light:

The 8 band LED grow light has two narrow peaks in the blue, and not much far red light above 650nm. It is not a good match to either the PAR curve or the McCree curve. The multi-band LED on the other hand, also has a poor blue portion of the spectrum with a narrow peak, but has a much closer match to the McCree curve in the Green/Yellow/Orange part of the spectrum, up to 640nm where it dips, then increases again to peak at 660nm.

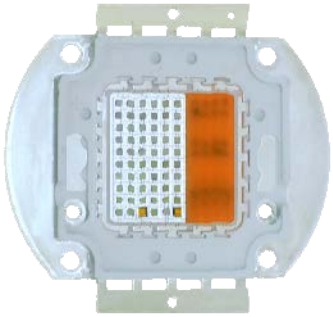


WHAT IS A COB?

COB is a contraction for "Chip On Board". In a COB, rather than the LEDs being individually encapsulated, they are mounted (with thermally conductive glue) onto a zinc plated, copper heat-sink. This provides a convenient package that is easy to handle, and also makes the thermal management simpler, as the COB format can be directly mounted to a

suitable heat-sink. Due to the popularity of COBs, there are also a wide range of accessories available for them, such as reflectors and lenses to control the beam-spread and/or focus the light onto the plants.

EconoLux COB Light-engines



We have chosen to call our COB products "light-engines" as they provided the engine for building complete LED plant/grow lights. The COBs provide all of the wavelengths required, and no extra, or external, LEDs are required to get the desired spectrum curve.

As mentioned before, the more bands (wavelengths) of LEDs one can include, the truer the final spectrum. Adding wavelengths however, increases costs, not only from the larger numbers of bands but the fact that some of the components are proprietary and thus expensive.

Additionally:

1] EconoLux uses high quality imported LED chips from selected international sources. These are more costly but we have chosen them because they consistently demonstrate better quality than cheaper mass produced chips.

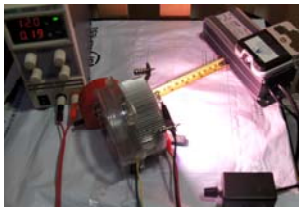
2] To get the exact wavelengths desired, the LED chips have to be individually tested and certified before encapsulation and assembly. This is a time and labour intensive process especially since numerous chips do not make the grade.

3] The robotic assembly machines (photo on right) that are used to assemble our COB chips need to make multiple passes to handle the plethora of discreet bandwidths we cover. This is another time and labour intensive operation.

4] EconoLux uses 99.99% pure gold wire for all of our wire-bonding. Other manufacturers use cheaper 99.9% gold wire, and some even use aluminum wire to cut costs.

5] Each unit we produce is "aged" for 12 hours (operated at full power for 12 hours) and then analyzed comparatively with our optimized spectrum to ensure that the emitted curve stays within our stringent quality assurance parameters.

It is this devotion to excellence that has enabled EconoLux Industries to create the world's first HG (High Granularity) multi-band, 100W, LED COB that has a 90% or 95% match to the PAR curve.



Testing the output of an LED COB Grow-light with a PPFD meter

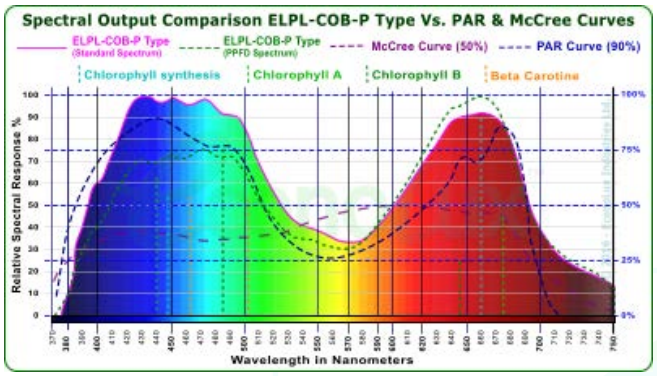
As you can see from the spectrum charts on the flowing page, the ELPL COBs offer full spectrum light output covering the range from 390nm to 750nm (the PAR rage if from 400nm to 700nm). The PPFD curve shows a discounting of the blue light, but the blue spectral curve remains smooth and broad.

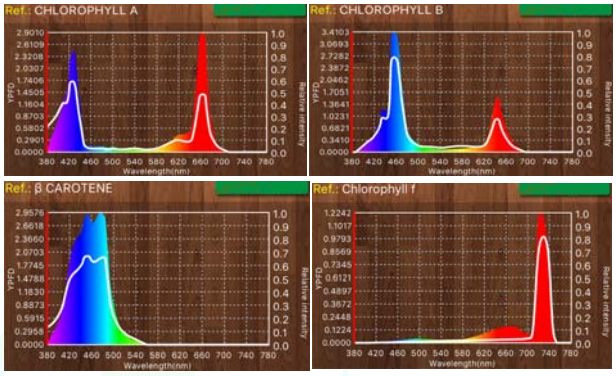
In addition, when compared to standard absorption curves for Chlorophyll A, B and F, and Beta Carotene (shown below the spectrum charts), the matches are almost perfect!

ELPL-COB-P - PAR Type

The EconoLux ELPL-COB-P, 24 band, LED grow light-engine is our LED COB (Chip On Board) product, available in 100W and 200W models. It has a 90% match to the PAR curve, making it ideal for growing leafy green plants, the vegetative stage of growth, and for general purpose growing.

The spectrum graph (below left) shows the ELPL-COB-P standard spectrum as the human eyes sees it (pink line with spectrum), the PAR curve (dashed blue line set to 90%), the McCree curve (dashed purple line set to 50%), the major plant-light absorption lines (vertical dashed lines) and the PPFD curve (dashed green line); overlaid onto the ELPL-COB-P spectrum.



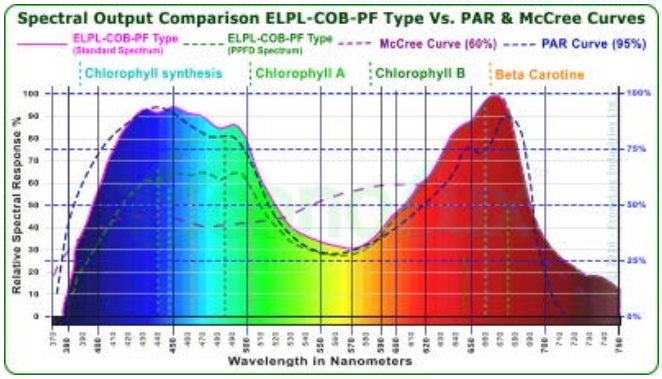


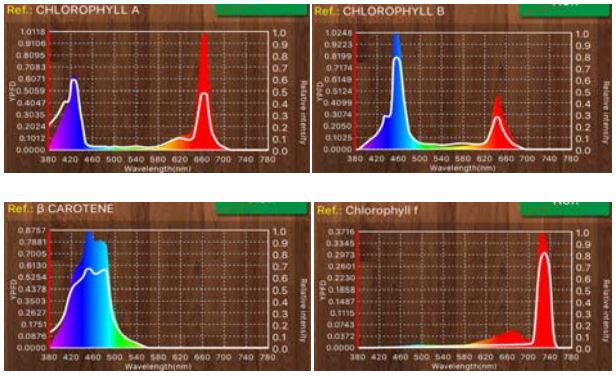
The graphs (above right), measuring in PPFD*, shows comparisons of the ELPL-COB-P's spectrum to standard curves for Chlorophyll, and Beta Carotene. The ELPL-COB-P's match to these curves is almost perfect.

ELPL-COB-PF - PAR Flowering Type

The EconoLux ELPL-COB-PF, 24 band, LED grow light-engine is our LED COB (Chip On Board) product, available in 100W and 200W models. It has a 95% match to the PAR curve, with extra Red light, making it ideal for growing fruiting, flowering or budding plants, as well as for general purpose growing.

The spectrum graph (below left) shows the ELPL-COB-PF standard spectrum as the human eyes sees it (pink line with spectrum), the PAR curve (dashed blue line set to 95%), the McCree curve (dashed purple line set to 50%), the major plant-light absorption lines (vertical dashed lines) and the PPFD curve (dashed green line); overlaid onto the ELPL-COB-PF spectrum.





The graphs (above right), measuring in PPFD*, shows comparisons of the ELPL-COB-PF's spectrum to standard curves for Chlorophyll, and Beta Carotene. The ELPL-COB-PF's match to these curves is almost perfect!

* **PPFD:** Lighting for plants is different from lighting for humans. Light energy for humans is measured in lumens, with light falling onto a surface measured as illuminance with units of lux (lumens per square meter) or footcandles (lumens per square foot). Light energy for plants, on the other hand, is measured as Photosynthetic Active Radiation (PAR), with light falling onto a surface measured as Photosynthetic Photon Flux Density (PPFD). - http://docs.agi32.com/AGi32/Content/adding_calculation_points/PPFD_Concepts.htm

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ELPL PRO-LED 100W LED PLANT/GROW LIGHT

The EconoLux ELPL PRO-LED 100W LED grow light is designed to meet the rigors of use in a professional greenhouse. It is waterproof (IP-65 Rated) so it can withstand high humidity environments, it is passively cooled (no fans) thus low maintenance.

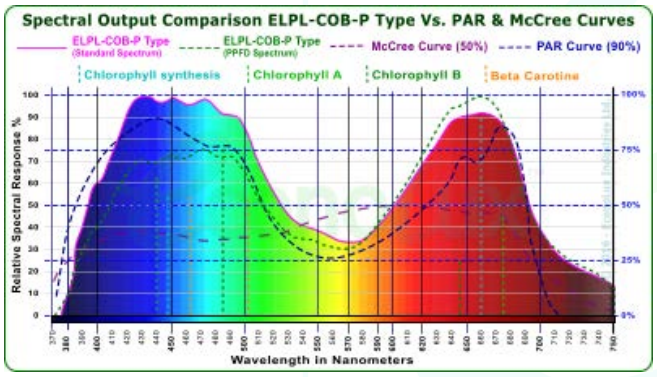
Powered by one of our ELPL-COB-100W series of 24 band LED COB light-engines, it's available with either the P type COB with 90% match to the PAR curve for leafy green and general purpose growing; or with one of our PF type COBs, with 95% match to the PAR curve, and 10% extra Red light for growing flowering or fruiting plants.

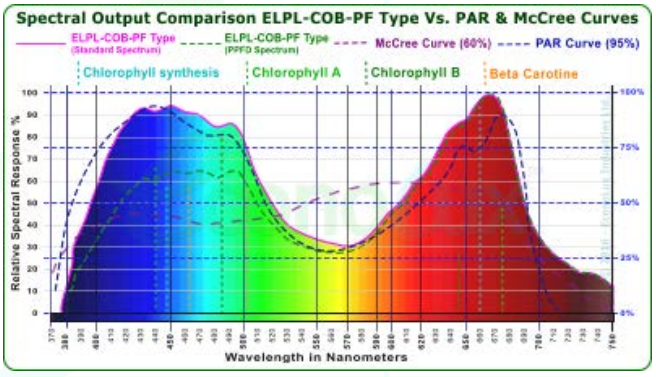
It produces 716 PAR/PPFD* at a distance of 30.5 cm (12") using the standard 45 degree lens - that's 7.16 PPFD/Watt!

ELPL PRO-LED 100W - LED PLANT/GROW LIGHT - Spectrum

Spectrum:

The ELPL PRO-LED 100W is available with either the P type or PF type COB light engines, with a spectrum which offers a 90% or 95% match to the PAR curve as shown in the graphs below:





ELPL PRO-LED 100W - LED PLANT/GROW LIGHT - Technical Specifications

Type: PF LED COB Light-engine

Nominal Wattage: 100W

Power Consumption: 0.45A @ 220 VAC - **PF** = 0.96

LED Lifespan: 50,000 Hours

Kelvin: 15,570K

Total PAR/PPFD* Output (µ-mol/M²/S): 1,715 @ 15cm (6"); 716 @ 30.5cm (12"); 318.74 @ 46cm (18") - using a PPFD meter with standard 45 degree lens and reflector

Lens: 45 degree standard (60 and 90 degree lenses optional)

AC Power Input: 100~250 VAC, 50/60 Hz (higher voltages input optionally available)

Driver: MeanWell constant current type

Warranty: 2 year limited warranty

Average Red/Blue Ratio: 1.24

DLI (Daily Light Integral - mol/m²/day)*: 123.72 / 12 hrs @ 30.5cm (12")

Luminance:# 6,246 Lumens @ 30.5cm (12") - Measured using the CIE curve

Certifications: UL and RoHS (CE/TUV and RoHS certified models optionally available)

Usage location: Indoors or Outdoors - IP-65 rated (waterproof)

Cooling: Passive heat-sink (no fans - low maintenance)

Materials: Body made of extruded and die-cast aircraft aluminum - powder coated for a durable finish

Dimensions: 34.1 X 27.3 X 19.3 Cm (13.4 X 10.9 X 7.6 In) Weight: 5.6 Kg (11.46 Lb)

*** Note:** Light energy for plants is measured as Photosynthetic Active Radiation (PAR), with light falling onto the surface of the plants measured as Photosynthetic Photon Flux Density (PPFD)

 # Note: Most of these measurements were made at a distance of 30.5cm (12"), with a 45 degree lens and reflector used. Readings will vary with distance from the light fixture, and the use of different supplementary optics (60 or 90 degree lens/reflector).

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ELPL PRO-LED 200W LED PLANT/GROW LIGHT

The EconoLux ELPL PRO-LED 200W LED grow light is designed to meet the rigors of use in professional greenhouses. It is waterproof (IP-65 Rated) so can withstand high humidity environments, it is passively cooled (no fans) thus low maintenance.

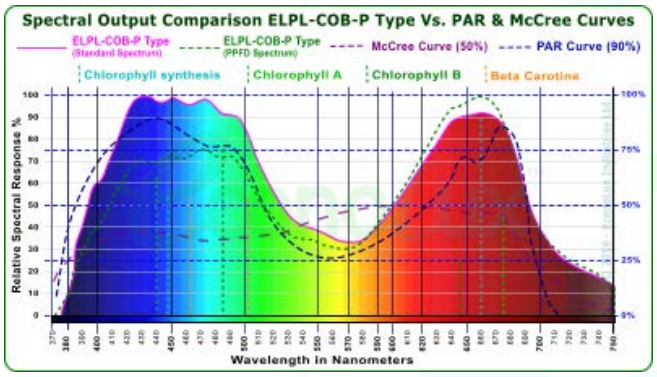
Powered by one of our ELPL-COB-200W series of 24 band LED COB light-engines, it is available with either the P type COB with 90% match to the PAR curve for leafy green and general purpose growing; or with one of our PF type COBs, with 95% match to the PAR curve, and 10% extra Red light for growing flowering or fruiting plants.

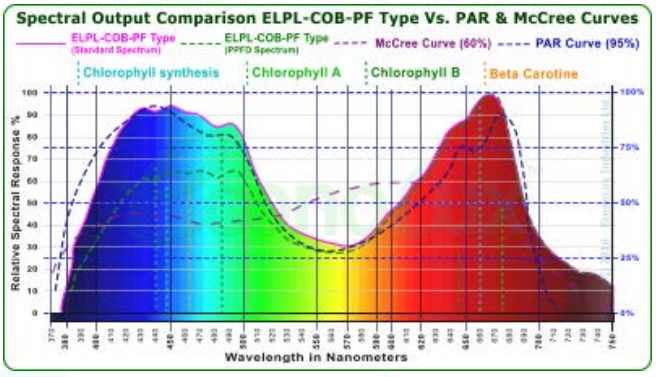
It produces 1,433 PAR/PPFD* at a distance of 30.5 cm (12") using the standard 45 degree lens - that's 7.16 PPFD/Watt!

ELPL PRO-LED 200W - LED PLANT/GROW LIGHT - Spectrum

Spectrum:

The ELPL PRO-LED 200W is available with either the P type or PF type COB light engines, with a spectrum which offers a 90% or 95% match to the PAR curve as shown in the graphs below:





ELPL PRO-LED 200W - LED PLANT/GROW LIGHT - Technical Specifications

Type: PF LED COB Light-engine

Nominal Wattage: 200W

Power Consumption: 0.9A @ 220 VAC - **PF** = 0.96

LED Lifespan: 50,000 Hours

Kelvin: 15,570K

Total PAR/PPFD* Output (µ-mol/M²/S): 3,430 @ 15cm (6"); 1,433 @ 30.5cm (12"); 637.49 @ 46cm (18") - using a PPFD meter with standard 45 degree lens and reflector

Lens: 45 degree standard (60 and 90 degree lenses optional)

AC Power Input: 100~250 VAC, 50/60 Hz (higher voltages input optionally available)

Driver: MeanWell constant current type

Warranty: 2 year limited warranty

Average Red/Blue Ratio: 1.24

DLI (Daily Light Integral - mol/m²/day)* : 247.45 / 12 hrs @ 30.5cm (12")

Luminance:# 12,492 Lumens @ 30.5cm (12") - Measured using the CIE curve

Certifications: UL and RoHS (CE/TUV and RoHS certified models optionally available)

Usage location: Indoors or Outdoors (IP-65 rated - waterproof)

Cooling: Passive heat-sink (no fans - low maintenance)

Materials: Body made of extruded and die-cast aircraft aluminum - powder coated for a durable finish

Carton Dimensions: 30.5 X 29 X 29 Cm (12.0 X 11.4 X 11.4 In) Weight: 7.6 Kg (16.7 Lb)

*** Note:** Light energy for plants is measured as Photosynthetic Active Radiation (PAR), with light falling onto the surface of the plants measured as Photosynthetic Photon Flux Density (PPFD)

 # Note: Most of these measurements were made at a distance of 30.5cm (12"), with a 45 degree lens and reflector used. Readings will vary with distance from the light fixture, and the use of different supplementary optics (60 or 90 degree lens/reflector).

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ELPL PRO-LED 400W LED PLANT/GROW LIGHT

The EconoLux ELPL PRO-LED 400W LED grow light is designed to meet the rigors of use in a professional greenhouse. It is waterproof (IP-65 Rated) so can withstand high humidity environments, it is passively cooled (no fans) thus its low maintenance.

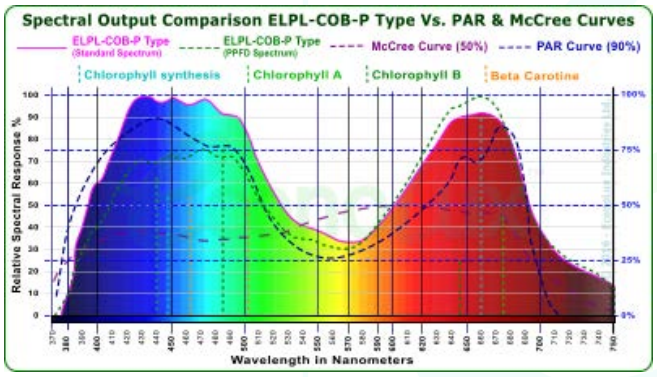
Powered by four of our ELPL-COB-100W series of 24 band LED COB light-engines, it is available with either the P type COBs with 90% match to the PAR curve for leafy green and general purpose growing; or with one of our PF type COBs, with 95% match to the PAR curve, and 10% extra Red light for growing flowering or fruiting plants.

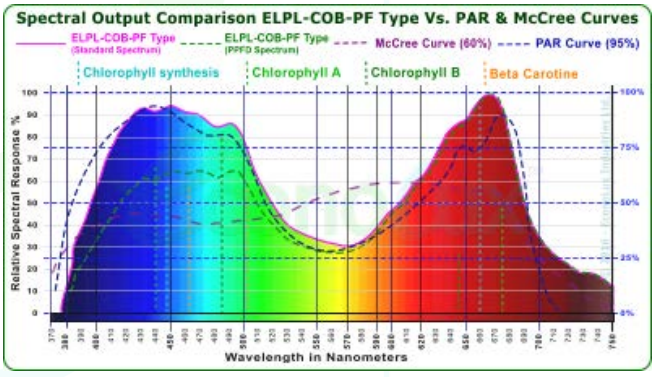
It produces 2,867 PAR/PPFD* at a distance of 30.5 cm (12") using the standard 45 degree lens - that's 7.17 PPFD/Watt!

ELPL PRO-LED 400W - LED PLANT/GROW LIGHT - Spectrum

Spectrum:

The ELPL PRO-LED 400W is available with either the P type or PF type COB light engines, with a spectrum which offers a 90% or 95% match to the PAR curve as shown in the graphs below:





ELPL PRO-LED 400W - LED PLANT/GROW LIGHT - Technical Specifications

Type: PF LED COB Light-engine

Nominal Wattage: 400W

Power Consumption: 1.8A @ 220 VAC - **PF** = 0.96

LED Lifespan: 50,000 Hours

Kelvin: 15,570K

Total PAR/PPFD* Output (µ-mol/M²/S): 6,860 @ 15cm (6"); 2,867 @ 30.5cm (12"); 1,275.8 @ 46cm (18") - using a PPFD meter with standard 45 degree lens and reflector

Lens: 45 degree standard (60 and 90 degree lenses optional)

AC Power Input: 100~250 VAC, 50/60 Hz (higher voltages input optionally available)

Driver: MeanWell constant current type

Warranty: 2 year limited warranty

Average Red/Blue Ratio: 1.24

DLI (Daily Light Integral - mol/m²/day)*: 495 / 12 hrs @ 30.5cm (12")

Luminance:# 24,985 Lumens @ 30.5cm (12") - Measured using the CIE curve

Certifications: CE/TUV and RoHS certified (UL certified drivers optionally available)

Usage location: Indoors or Outdoors (IP-65 - waterproof)

Cooling: Passive heat-sink (no fans - low maintenance)

Materials: Body made of extruded and die-cast aircraft aluminum - powder coated for a durable finish

Dimensions: 42.6 X 43.7 X 27 Cm (16.8 X 17.2 X 10.6 In)

Weight: 12.3 Kg (27.1 Lb)

*** Note:** Light energy for plants is measured as Photosynthetic Active Radiation (PAR), with light falling onto the surface of the plants measured as Photosynthetic Photon Flux Density (PPFD)

 # Note: Most of these measurements were made at a distance of 30.5cm (12"), with a 45 degree lens and reflector used. Readings will vary with distance from the light fixture, and the use of different supplementary optics (60 or 90 degree lens/reflector).

SUMMARY - ELPL PRO-LED Series of Plant/Grow lights

The ELPL PRO-LED series of Plant/Grow-lights is designed to meet the often harsh conditions found in professional greenhouses and licensed grow-ops. They feature:

- **IP-65 rated** - waterproof so can resist the high humidity found in greenhouses;
- **Passive Cooling** - Low maintenances as there are no fans to repair/replace, and they can be cleaned as needed with a water hose;
- **Long Lifespan** - 50,000 Hours rated lifespan (that's 11.4 years at 12 hours usage per day) ;
- **Universal Voltage Input:** Standard models are 100~250VAC 50/60 Hz power input - other voltages optionally available;
- **Custom Optics:** Standard models have 45 degree lenses to concentrate light onto the plants - 60, 90 and 120 degree lenses optionally available.

The PRO-LED series is based on our exceptional COB (Chip On Board) LED Light-engines which are a world's first, cutting edge, innovation. With a previously unheard of 24 bands (wavelengths) of LEDs, they provides a very close match (90% ~ 95%) to the PAR curve! They are presently available in two models:

1] The ELPL-COB-P, 24 band, LED Light-engine, has a spectrum with a close (90%) match to the PAR curve. It is good for leafy green plants and general purpose growing of all plant types.

2] The ELPL-COB-PF, 24 band, Light-engine, that has a spectrum with a close (95%) match to the PAR curve. It is good for growing all plant types, especially flowering/fruiting plants, as it has about 10% more red light than the standard PAR curve.

The ELPL PRO-LED series is the ideal choice for use in the high humidity environment and often harsh conditions found in professional greenhouses. They provide high PPFD with a close match (90~95%) to the PAR curve.

Your Authorized EconoLux Industries ELPL PRO-LED Series Distributor:

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