

Horticultural

Lighting Solutions

EN-2019-HLS



About Us

Our company, PSL Electronic, which is the first Turkish company that applies Fiber Optic lighting systems in Turkey as a manufacturer, was established in Antalya 1991. Our company, which concentrated on "Professional Audio and Light" systems at first, pursued studies on decorative Fiber Optic ligting applications in 1997 and accomplished applications which are highly successful and each of which is a first and trendsetter in its field.

The achieved succesful projects have derived our company to concentrate in the filed of decorative architectural lighting and our company, gradually pulling away from the field of "audio and light" systems, completely steered towards the field of lighting by creating the "FiBERLI" brand in 2000s.

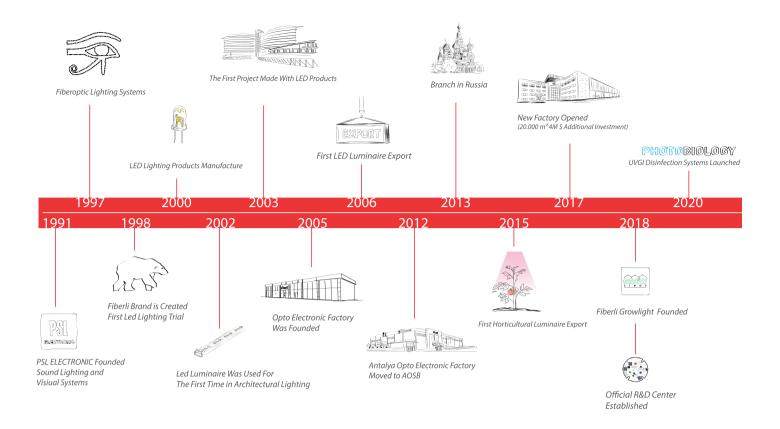
In 2017, for the purpose of providing a service with much higher capacity, pace and quality, we have moved to our new factory established on a 20.000 m2 area within the Antalya Organized Industrial Zone and commenced manufacturing. Presently our company, which has accomplished more than 800 large scaled projects up untill now;

- Has nearly 300 hundred employees
- Carries out projects and applications customly designed for individuals or businesses,
- Has one of the four R&D center in Turkey's lighting industry
- Has design unit with a team of experts in lighting field.

We would like to take this opportunity and once again thank you, our esteemed customers, who have guided us to this day and never refrained their support.

Why Polar Bear?

Polar bears have white, thick fur that protects them from cold since they live in vast areas covered by glaciers. In fact, they have black skin which covered with transparent hairs. The transparent hairs function as fiber optic conductors. The hairs collect ultra-violet light and direct it to the black skin where it is converted into heat. Which means energy saving by heat insulation. Given these facts, we believed a logo design with a "Polar Bear" is the best visual language which describes the perfect harmony of nature and technology for our brand "Fiberli".



Export more than **40** countries



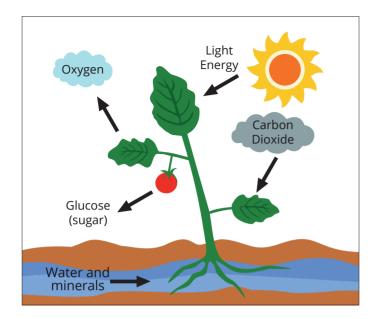


GREEN TECHNOLOGY

Fiberli has adopted the principle of energy efficiency and sustainable environment. Due to respect for nature and life, it is preferred to use completely unleaded materials with ROHS certification in production. The research results have proven that our highly efficient products provide energy conservation and prevent tons of CO2 emissions.

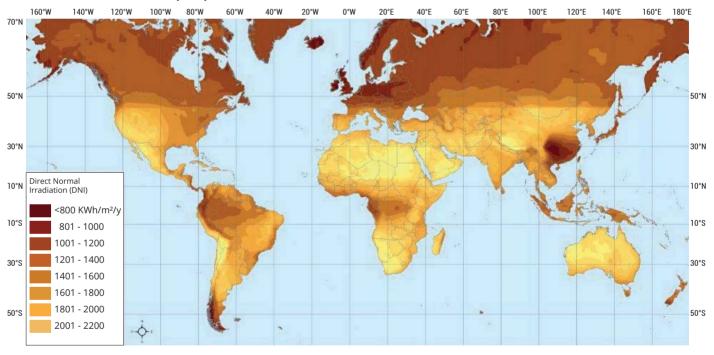


2019 - 2020 HORTICULTURAL LED LIGHTING SOLUTIONS



Nature provides all the resources that a plant needs, however **Natural Light Energy** is not controllable parameter.

We can find or add everything naturally or artificially to process! Except lighting. **Light Energy** will be the game changer.



Direct Normal Irradiation (DNI)

Many of northern hemisphere countries need better lighting conditions for better yield in farming.

The new valuable technology is **LED LIGHTING.**

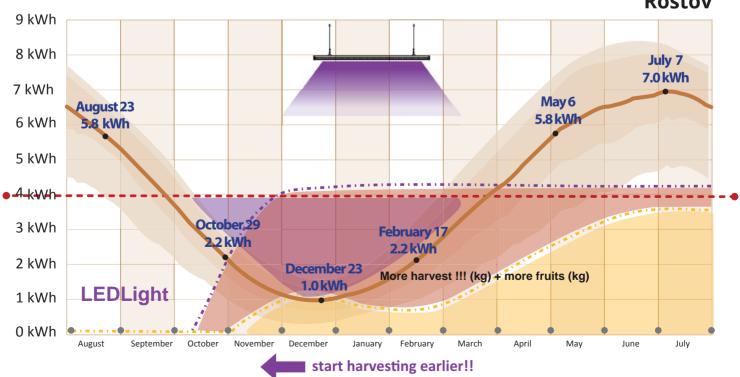
In fact, plants need to receive only specific color combinations from the light and this is where LED LIGHTING technology comes into play.

By LED technology, it is possible to provide the most effective light energy for plants and also, it gives us the opportunity to control what we provide.



	SEEDING	Fully Optimized & Automated
	BLOOMING	Processes With The Best
	GROWING	Flexibility & Efficiency
	CULTIVATING	
	FRUCTIFICATION	
	CROP	
	TIMING	
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	PROFIT	And the second sec
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Timeline of Agricultural Development



Rostov



FİBERLİ launched the Horticultural Lighting product range with a perfect balance of scientific FİBERLİ launched the horticultural lighting product range with a perfect balance of scientific know-how and innovative design. and innovative design.



Seasonal changes, decrease in agricultural areas and nutritional demand of the increasing population are highlighting the importance of productivity in agriculture. The light colors required for photosynthesis in agricultural luminaires are applied in a certain knee, making them an artificial light source. Thanks to the advantages of **LED technology**, conventionel lighting fixtures have been transformed to **LED in the agricultural** area as in many other illuminated areas. With the low electricity consumption provided by the LED, new project investments are becoming more attractive.

Criteria [*]	HPS	LED
Typical Lifetime (h)	6.000-8.000h	35.000-50.000h
Light Spectrum	Static Spectrum (Very few far red and blue, too much yellow most not needed	Able to provide the light spectrum that plant needs to be able grow.
Efficiency	Critical amount of Energy loss as it gives out unnecessary light spectrum. Also the shape of the lamp and light distribution of the lamp causes light to get lost through reflectors, holders and luminaire body design.	Most efficient umol because of requested spectrum optimization, directed light source as an advantage of LED
Ignition delay, Re-Ignition delay	3-8 minutes delay for the first run, re-ignition may take 10-15 minutes because of cooling down time as a result of energy fail.	No delay in reaching maximum level, also no delay for re-ignition
Automation	No automation chance. Just On-Off with dis-advantages of ignition delays	LED is the most flexible light source because of automation compatibility. Adjustable Light Spectrums and Light Levels are possible
Design& Darkshadespots& Homogenious light distribution in greenhouse	Bigger luminaires cause dark spots and non- homogenious light distribution on plants	LED is most flexible light source because of sizes of chips. Lineer Solutions makes no dark spot on daytime with its body design. Thinner design than greenhouse metal structure is mostly possible. Also it makes homogenious continuous light distribution on plants

* Criteria comparison table for renovation of HPS lighting to LED at greenhouses.

Advantage of LED Horticultural Lighting



Provides maximum harvest efficiency with limited investment and operating cost.

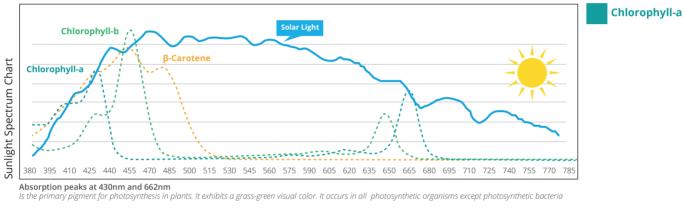
Can be used in all kinds of agricultural facilities due to its durable structure.

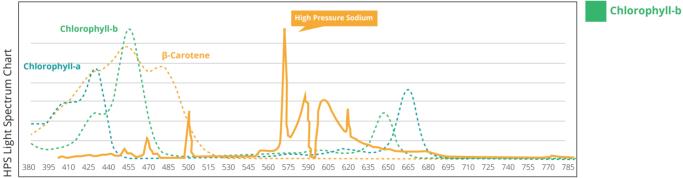
With the automation system, a self-contained system can be created by sensor and control elements.

Higher efficiency can be achieved by adjusting the light levels that plants need at different stages such as sprouting, flowering, and fruiting.

Since the luminaires do not overheat, they can be applied in suitable position without damaging the plants.

Lower carbon footprint and improve quality by introducing affordable, energy efficient LEDs.



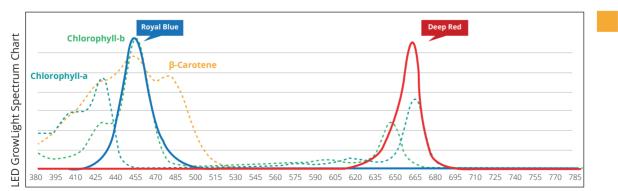


Carotenoids

(α/β-Carotene)

Absorption peaks at 453nm and 642nm

about half as much chlorophyll-b as the -a variety in plants. Exhibits a blue-green visual color. It occurs in all plants, green algae and some There is usua prokaryotes



Absorption is strong between 420nm and 485nm

Carotenes are strongly colored red-orange pigments abundant in plants, fruits, vegetables and whole grains. Xanthophylls are the typical yellow pigments of leaves. Carotenoids contribute to photosynthesis and protects from excessive light damage.



The LED Expertise

Fiberli presents it's expertise in LED Lighting and it's innovative perspective in the field of agricultural lighting. Our scientists and engineers work closely together with customers to find the best solution that meets the requirements of variety of growing environments.



The Modern Greenhouse Know-How

Turkey is one of the most well known country of all in agriculture. With Turkey's experience with 2000 hectare of modern greenhouse management, it is safe to say that we have the know-how and the technology to help you create the best greenhouse environment.



Project Support

Our experts provide luminaire selection and placement support with precise measurements and evaluations. They come up with solutions to maximize efficiency by considering many variables such as location, plant type and application area.



Production, Delivery and installation

Lighting fixtures are produced and delivered delivered in timely manner and with the Fiberli quality. According to project content, our expert technical team can offer fast and secure installation support without affecting your operation.

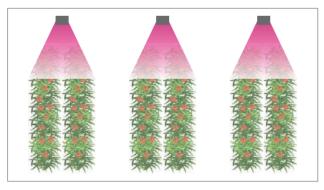


After Sales Support

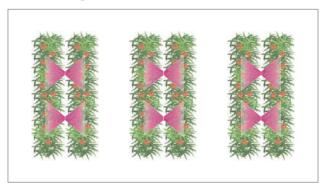
We do not leave you with our after sales support after the end of the project. Our total quality-oriented technical support and guarantee teams ensure sustainable satisfaction by taking rapid action when necessary. We do not leave you till the end of the project. Our after sales services are always there for you.

Possible Solutions

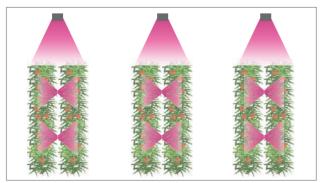
TOP GrowLight



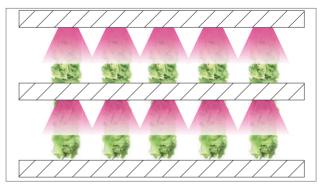
Inter GrowLight



TOP & Inter GrowLight



Rack GrowLight



CONTENTS

TOP GrowLight Series

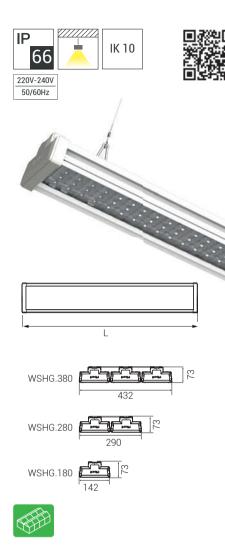


InterLight Series



Rack GrowLight Series





Groot. A real superhero member of Growlight family. TOPLIGHT segment aims general lighting range for greenhouses via ceiling mount. Stable, long life solution with high IP&IK levels. Suits for all greenhouse facilities. Controllable, east to mount, automation ready, flexible spectrum on request GROWLIGHT solution. Expanding options with special body design.

Electromechanic Specifications

- Adonized aluminum extruded profile
- UV protected PVC end caps
- High efficient transparent PMMA diffuser
- Stainless steel mounting brackets
- Stainless steel hanger springs (for hook/ chain etc.)
- Hidden cable grommet desing
- IP67 electrical connectors
- Modular body design with 2x/3x expanding options
- LED spectrum can be change on request

P Power Options

Code	Power	Light Energy	Efficiency	PPF Distribution	Dimensions (L)
WSHG.180	160-210W	410-620µmol/s	2.6–3.2 µmol/J	30°, 60°, 120°	823mm
WSHG.280	320-420W	820-1240µmol/s	2.6–3.2 µmol/J	30°, 60°, 120°	823mm
WSHG.380	480-630W	1230-1860µmol/s	2.6–3.2 µmol/J	30°, 60°, 120°	823mm
WSHG.380UV	250-330W	650-1000µmol/s	2.6-3.2 µmol/J	30°, 60°, 120°	1225mm

O Lens Options OMB: OWB: OXW: 30° OWB: OXW:



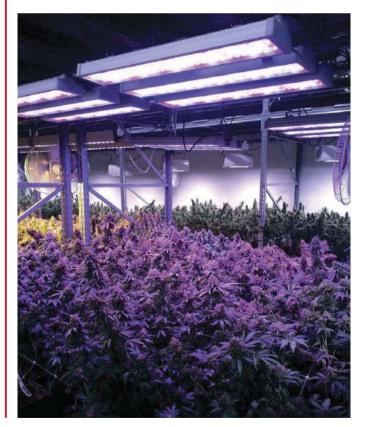
J Connection Options

02: IP Socket





Surface/ Cable Tray/ Pendant Mounting







Canna Groot



P Power Options

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	_	_	_	-	_	_	_	_	_	_	_	_

Code	Power	Light Energy	PPF
WSHG 2x240	1200-1350W	2400-3200µmol/s	3

nergy	PPF Distribution	(A)		
0µmol/s	30°, 60°, 120°	2350		



 OMB:
 OWB:
 OXW:

 30°
 60°
 120°





Mounting Options



Surface/ Cable Tray/ Pendant Mounting



High and powerful ceiling light.

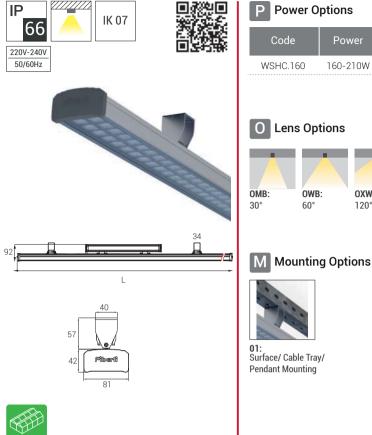
The design that combines the projector feature with GROWLIGHT fields. It provides powerful and long-lasting performance under any circumstances, with lens-appropriate light-dispensing lens options.

Electromechanic Specifications

- Adonized aluminum extruded profile
- PVC protective covers
- Stainless steel mounting brackets
- Stainless steel hanger springs (for hook/ chain etc.)
- Hidden cable grommet desing
- IP67 electrical connectors
- LED spectrum can be change on request







Crop. To maximize your crop. Powerful option of Growlight family. TOPLIGHT segment aims general lighting range for greenhouses via ceiling mount. CROP also does not crop sunlight. Thanks to its thinner design which fits to all greenhouse construction profiles. Stable, long life solution witg high IP&IK levels. Suits for all greenhouse facilities. Controllable, easy to mount, automation ready, flexible spectrum on request GROWLIGHT solution.

Electromechanic Specifications

- · Adonized aluminum extruded profile
- UV protected PVC end caps
- High efficient clear glass diffuser
- Stainless steel mounting brackets
- Stainless steel hanger springs (for hook/ chain etc.)
- Hidden cable grommet desing
- IP67 electrical connectors
- LED spectrum can be change on request



Code Key

P.O.J.M

P Power Options

Code	Power	Light Energy	Efficiency	PPF Distribution	Dimensions (L)
WSHC.160	160-210W	410-620µmol/s	2.6-3.2 µmol/J	30°, 60°, 120°	1600mm

0 Lens Options

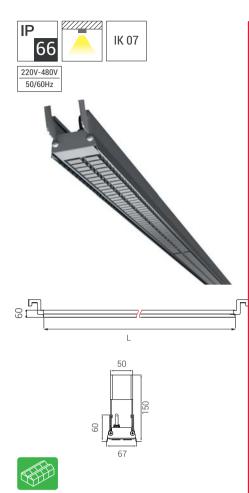
OMB: OWB: OXW: 60° 120°

J Connection Options









Hook. The hook system provides easy installation without cable channel. Powerful option of Growlight family. TOPLIGHT segment aims general lighting range for greenhouses via ceiling mount. HOOK also does not crop sunlight. Thanks to its thinner design which fits to all greenhouse construction profiles. Stable, long life solution witg high IP&IK levels. Suits for all greenhouse facilities. Controllable, easy to mount, automation ready, flexible spectrum on request GROWLIGHT solution.

Electromechanic Specifications

- Adonized aluminum extruded profile
- PVC protective covers
- Stainless steel mounting brackets
- ${\boldsymbol \cdot}$ Stainless steel hanger springs (for hook/ chain etc.)
- Hidden cable grommet desing
- IP67 electrical connectors
- LED spectrum can be change on request

P Power Options

Code	Power	Light Energy	Efficiency	PPF Distribution	Dimensions (L)
WSHH.120	90-110W	350-450µmol/s	2.6-3.2µmol/J	30°, 60°, 120°	1200mm
WSHH.400	350-410W	1050-1500µmol/s	2.6-3.2µmol/J	30°, 60°, 120°	4000mm
WSHH.450	480-540W	1250-1650µmol/s	2.6-3.2µmol/J	30°, 60°, 120°	4300mm
WSHH.500	520-580W	1450-1800µmol/s	2.6-3.2µmol/J	30°, 60°, 120°	5000mm

O Lens Options

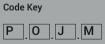




Surface/ Cable Tray/ Pendant Mounting



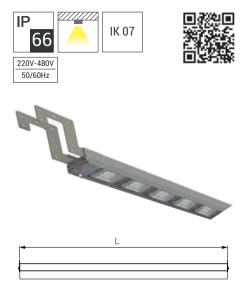








02: IP Socket



P Power Options

Code	Power	Light Energy	Efficiency	PPF Distribution	Dimensions (L)
Hook Modular	480-640W	1370-1960 µmol/s	2.6-3.2µmol/J	30°, 60°, 120°	4000mm
Hook Modular	540-720W	1620-2150 µmol/s	2.6-3.2µmol/J	30°, 60°, 120°	4500mm
Hook Modular	600-800W	1880-2340 µmol/s	2.6-3.2µmol/J	30°, 60°, 120°	5000mm

O Lens Options



Connection Options

M Mounting Options

OXW: Without Lens



Surface/ Cable Tray/ Pendant Mounting

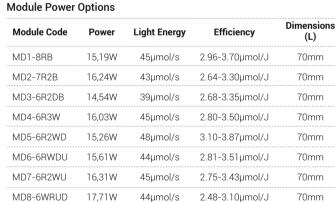
With modular LED structure, light spectrum and illumination power can be changed.

The hook system provides easy installation without cable channel. Powerful option of Growlight family. TOPLIGHT segment aims at general lighting range for greenhouses via ceiling mount. HOOK also does not crop sunlight. Thanks to its thinner design which fits to all greenhouse construction profiles.

Suits for all greenhouse facilities. Controllable, easy to mount, automation ready, flexible spectrum on request GROWLIGHT solution.

Electromechanic Specifications

- · Adonized aluminum extruded profile
- PVC protective covers
- Stainless steel mounting brackets
- Stainless steel hanger springs (for hook/ chain etc.)
- Hidden cable grommet desing
- IP67 electrical connectors
- LED spectrum can be change on request
- Modular LED structure





Module Mounting Type



Up to 14 modules can be assemble for 1m profile



Code Key



Hook Modular

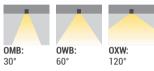
IP IK 07 66 220V-480V 50/60Hz



P Power Options

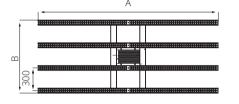
Code	Power	Light Energy	PPF Distribution	Dimensions (AxB)
WSHH-3x240	900-1000W	1800-2400µmol/s	30°, 60°, 120°	2400x597
WSHH-3x240	900-1000W	1800-2400µmol/s	30°, 60°, 120°	2400x665
WSHH-4x240	1200-1350W	2400-3200µmol/s	30°, 60°, 120°	2400x967
WSHH-4x240UV	1200-1350W	2400-3200µmol/s	30°, 60°, 120°	2400x967

0 Lens Options





02: IP Socket



Μ **Mounting Options**



Pendant Mounting

High and powerful ceiling light.

The design that combines the projector feature with GROWLIGHT fields. It provides powerful and long-lasting performance under any circumstances, with lens-appropriate light-dispensing lens options.

Electromechanic Specifications

- Adonized aluminum extruded profile
- PVC protective covers
- Stainless steel mounting brackets
- Stainless steel hanger springs (for hook/ chain etc.)
- Hidden cable grommet desing
- IP67 electrical connectors
- LED spectrum can be change on request



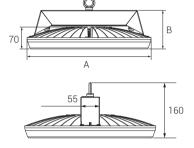




Multi Spectrum Canna WSHHM-3X240









Design that combines high efficiency and technology. High-performance and long-lasting solution in all conditions with a choice of height-distributing lenses and a wide range of mounting options.

Electromechanic Specifications

- Electrostatic painted aluminum injection body
- High efficiency group lens
- $\boldsymbol{\cdot}$ Stainless steel mounting clip and hanger part
- Optional stainless Busbar mounting bracket

P Power Options

Code	Power	Light Energy	Efficiency	PPF Distribution	Dimensions (AxB)
SEVİLAY600 300W	300-380W	720-900µmol/s	2.6-3.2µmol/J	120°	Ø380x113mm
SEVİLAY1000 600W	500-680W	1450-1800µmol/s	2.6-3.2µmol/J	120°	Ø380x113mm
SEVİLAY1000 600W-DIM	500-680W	1450-1800µmol/s	2.6-3.2µmol/J	120°	Ø380x113mm

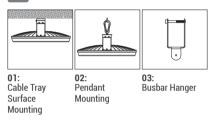






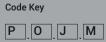
J Connection Options

Mounting Options















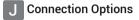
Code	Power	Light Energy	Efficiency	Dimensions (L)
GÜNAY1000	600-700W	1600-2150µmol/s	2.6-3.2 µmol/J	600mm

0 Lens Options



70

250



02: IP Socket



Powerful option of Growlight family. TOPLIGHT segment aims general lighting range for greenhouses via ceiling mount. Suits for all greenhouse facilities. Controllable, easy to mount, automation ready, flexible spectrum on request GROWLIGHT solution.

132

Electromechanic Specifications

- Adonized aluminum extruded profile
- Electrostatic painted aluminum injection body
- Stainless steel mounting clip and hanger part







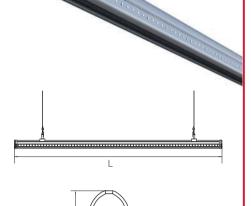
Inter GrowLight





P Power Options

Code	Power	Light Energy	Efficiency	Dimensions (L)
LLHD.120	32-55W	154 µmol/s	2.6-3.1 µmol/J	1200mm
LLHD.240	64-110W	308 µmol/s	2.6-3.1 µmol/J	2400mm
LLHD.400	100-180W	512 µmol/s	2.6-3.1 µmol/J	4000mm
LLHD.450	120-200W	564 µmol/s	2.6-3.1 µmol/J	4500mm
LLHD.500	140-220W	616 µmol/s	2.6-3.1 µmol/J	5000mm



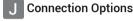
0 Lens Options



Mounting Options



01: Surface/ Cable Tray/ Pendant Mounting







50

Dual. A game changer for agriculture & horticulture. Special designed body goes between the plants to maximize its light energy delivery. INTERLIGHT segment aims closer and high efficient solutions. Hanging options make easy access and flexibility. Suits for all greenhouse facilities. Controllable, east to mount, automation ready, flexible spectrum on request GROWLIGHT solution. Expanding options with special body design.

30

Electromechanic Specifications

- Double sided maximum light energy distribution
- Stainless steel mounting brackets
- Stainless steel hanger springs
- Can be placed continuously via optional special hanger part.
- High efficient transparent PMMA diffuser



Code Key



Rack GrowLight







20

35

29

53

P Power Options

Code	Power	Light Energy	Efficiency	Dimensions (L)
LLHM FULL S	30-36W	90-110 µmol/s	2,6-3,1 µmol/J	1200mm
LLHM.120.White	36W	5000 Lm	140Lm/W	1200mm

0 Lens Options



Mounting Options



01: Surface/ Cable Tray/ Pendant Mounting

OXW: Without Lens

Mono. Future of farming. Thanks to its slim design and flexibility, MONO is perfectly suitable for climate-controlled cultivation facilities, such as city/vertical farms, propagation and research centers that use multilayer rack systems. Also provides cost effective solution due to its high energy efficiency and long-life structure. Controllable, easy to mount, automation ready, flexible spectrum on request GROWLIGHT solution. Expanding options with special body design.

Electromechanic Specifications

- Anodized aluminum extruded profile
- UV protected PVC end caps
- High efficient PMMA diffuser
- Stainless steel mounting brackets
- LED spectrum can be change on request



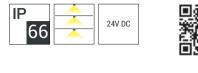
Code Key



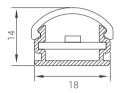




Rack GrowLight







P Power Options

Code	Power	Lumen	Light Energy	Light Color	Dimension (L)
LLHG.014	14,4W	1440lm	50 µmol/m [*] s	6500K	1000mm

Mounting Options



01: Aluminium Clip



Graft. Future of farming. Designed specifically for use in grafted seedlings. Thanks to its slim design and flexibility, GRAFT is perfectly suitable for climate-controlled cultivation facilities, such as city/vertical farms, propagation and research centers that use multilayer rack systems. Also provides cost effective solution due to its high energy efficiency and long-life structure. Controllable, easy to mount, automation ready, flexible spectrum on request GROWLIGHT solution. Expanding options with special body design.

Electromechanic Specifications

- Anodized aluminum profile extrusion
- Stainless fittings
- $\boldsymbol{\cdot}$ PVC end caps with UV protection
- Transparent or matte top cover polycarbonate
 with UV protection
- Suitable for surface mounting



Order Key













Technical Information

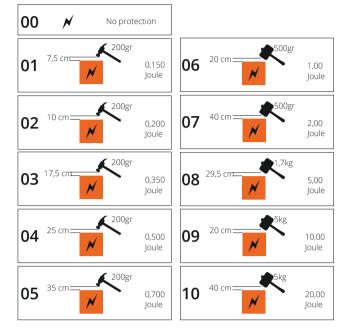
International Protection (IP) Classification

Liquid Particule Protection Solid Particule Protection

0 Not protected	0 Not protected
Any object bigger than 50 mm	Dripping water
2 Any object bigger than 12 mm	2 Vertically dripping water at an angle up to 15°
Any object bigger than 2,5 mm	Water falling as a spray at any angle up to 60°
4 Any object bigger than 1 mm	4 X Splashing water
5 N Dust protected	5 Water jets
6	6 Powerful water jets
	7 Iscm Immersion up to 15 cm
	1m Immersion beyond 1 m

via the protective conductor.

IK- Mechanical Impact Resistance



Electromagnetic Spectrum: The range of frequencies of electromagnetic radiation and their respective wavelengths and photon energies. HPS: A sodium-vapor lamp is a gas-discharge lamp that uses sodium in an excited state to produce light at a characteristic wavelength near 589 nm. PAR (Photosynthetically Active Radiation): Wavelengths of light within the visible range of 400-700 nm to drive photosynthesis. PPF (Photosynthetic Photon Flux): A measurement that determines the total amount of photosynthetically active radiation (PAR) a light gives off. Efficiency: Converted electrical energy into photons of PAR.

Ta -30° +45°

Ambient temperature dictates the minimum and maximum temperature at which the luminaries can be operated.

Rated Average Lifetime describes %50 of luminaires will produce 90% of the initial lumens after 35.000 h

35.000h L90B50

 (\div)

Protection Items in this class have an earth circuit built in and an earth wire in the plug. Metal parts of the products could potential cause a hazardous voltage if the basic insulation fails. This basically means that all metal parts of the products need to be earthed Class I:



Toplight: Grow Light LED luminaires designed to illuminate plants from top position. Luminaries are usually mounted or suspended under a cable tray.

Interlight: Grow Light LED luminaires designed to illuminate from sideway and positioned between plants.

Racklight: Grow Light LED luminaires designed to use on rack systems that also known as vertical/city farming.

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