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ELPL-T5HO UV+ LAMPS CATALOGUE

SPECIAL PURPOSE T5HO GROW LIGHT TUBES

Q1 - 2015

HYDROPONIC DEALERS AND OEMS ONLY



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EconoLux ELPL-T5HO UV+ Plant/Grow-Lights



The EconoLux Industries ELPL-T5HO-UV+ series of energy saving T5 High Output Plant/Grow-lights are the world's first purpose-designed T5HO lamps for exposing plants to the UVA and UVB light they would naturally receive if they were growing outdoors. Exposure to UVA and UVB light can help to simulate the effects of natural sunshine on indoor plants, increasing the plant's production of medicinal compounds, and beneficial anti-oxidants.

The EconoLux ELPL-T5HO UV+ lamps are the result of years of research and development. The UV+ lamp coatings are made of a proprietary blend of domestic and imported phosphors, designed to **maximize UVA and UVB light output** for plant growing applications.

Background:

Scientific Studies [1,2,3,4,5] have shown that exposure to UVB and UVA light can increase Cannabis plants production of medicinally beneficial resins by 2.5% to 5%. Because the Cannabis Sativa and Cannabis Indica plants originated in the mountainous regions of Central Asia, grew at high altitudes, and with clean mountain air, the plants were naturally exposed to higher levels of UVA and UVB radiation from sunlight, thus they have evolved to utilize the UV light.



Exposing your Medicinal Cannabis plants to UVA and UVB light from the ELPL-T5HO UV+ lamps, can help to simulate high altitude sunlight, thereby increasing the plants resin production. UV light exposure stimulates the cannabis plants production of compounds such as malonyl-CoA and Olivitol, which the plants use to make THC, and other medicinal compounds. Thus UV light exposure increases the potency of the plants.

Red leaf lettuces (*Lactuca sativa* lettuces with red leaves), which include "New Red Fire Lettuce", "Red Sails Lettuce", "Redina Lettuce", and "Benito Lettuce", benefit from exposure to UV light. Red Lettuce exposed to the right type of ultraviolet light, can boost levels of nutritionally beneficial carotenoids [6].



Lolla Rosso lettuce under 3 UV conditions

Dietary carotenoids are biological antioxidants that protect human cells and tissue from damage caused by naturally occurring oxygen free radicals in the human body. Consistently eating carotenoids obtained from green leafy vegetables, along with a healthy diet, may help reduce the risk of cataracts and macular degeneration later in life.

Greenhouse house grown lettuces where LEFT: no UV light; MIDDLE: UV-A light only; and RIGHT: UVA + UVB light resulting in higher levels of phenolic antioxidants. (Photo courtesy of Steve Britz, ARS)

While some growers have repurposed "reptile lights" to provide UV light exposure to their plants, the EconoLux ELPL-T5HO-UV+ lamps are the only T5HO lamps/tubes on the market purpose-designed for this application.

References:

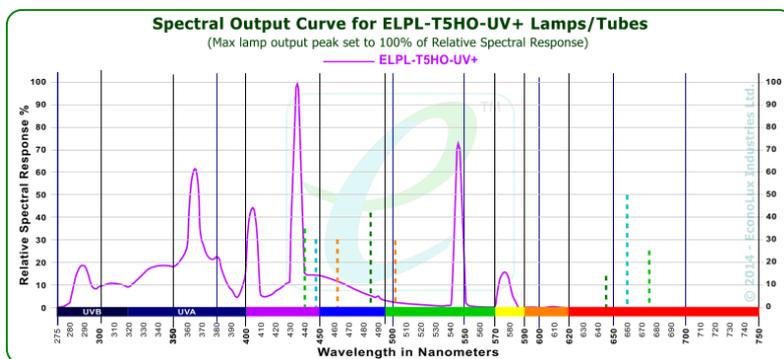
- 1] "A chemotaxonomic analysis of cannabinoid variation in Cannabis (Cannabaceae)" - KARL W. HILLIG2 AND PAUL G. MAHLBERG - Department of Biology, Indiana University.
- 2] "The effects of ultraviolet-B radiation on the growth, physiology and cannabinoid production of Cannabis sativa L." - John Lydon - Thesis (Ph. D.) - University of Maryland, College Park, 1985.
- 3] "UV-B radiation effects on photosynthesis, growth and cannabinoid production of two Cannabis sativa chemotypes" - Lydon J, Teramura AH, Coffman CB - PMID: 3628508.
- 4] "Chemical ecology of Cannabis" - Pate, D.W., 1994 - Journal of the International Hemp Association 2: 29, 32-37.
- 5] "The effect of ultraviolet radiation on the accumulation of medicinal compounds in plants" - Wen Jing Zhang, Lars Olof Björn - Lund University, Department of Cell and Organism Biology, 2009.
- 6] "Effect of supplemental ultraviolet radiation on the concentration of phytonutrients in green and red leaf lettuce (*Lactuca sativa*) cultivars" - Steven Britz, Charles Caldwell, Roman Mirecki, James Slusser & Wei Gao - Proc. SPIE 588

Output Spectrum:

The UV portion of the spectrum is divided into three sections;

- **UVC (100~270nm, Shortwave):** Low quantities of these wavelengths are found in natural sunlight. High intensity exposure to these wavelengths causes the disruption of DNA in biological organisms preventing them from reproducing and can cause cancer in humans.
- **UVB (275~320nm, Medium wave):** These wavelengths occur naturally in sunlight and are responsible for “sun tans”, but are also beneficial to certain plants. Prolonged human exposure to these wavelengths can cause certain types of melanoma (skin cancer).
- **UVA (325~400nm, Long wave):** These wavelengths occur naturally in sunlight, and are beneficial to a wide range of plants. They are most commonly known as “black-light”, which makes certain inks and pigments “glow in the dark” (fluorescence).

The EconoLux ELPL-T5HO-UV+ plant/grow light tubes provides the maximum of UV output with **12.5% UVB light and 38.4% UVA light** (see output statistic section of the integrating sphere test report, provided in the **Appendix** section (Page 7) at the end of this catalogue).



The graph (left) shows the light output spectrum from the **EconoLux ELPL-T5HO-UV+ type lamps** (violet line). The **majority of the light output is in the UVB and UVA regions** of the spectrum, with a small amount of blue and green light (see the integrating sphere test report, provided in the **Appendix** section (Page 7) at the end of this catalogue for more details).

CAUTION: Exposure to high levels of UVB light can cause a sun-tan or other skin related issues. The lights should be installed with a **switch outside the grow room** so they can be turned off if you need to enter the room while they are in operation, or you should wear appropriate eye and skin protection while working around the lamps when they are operating.

Useful Light Output:

The **ELPL-T5HO-UV+** series of tubes are **NOT** designed to be the sole light source for growing plants as they are deficient in blue and red light by design. They are designed as supplemental lighting for exposing plants to the UVA and UVB light found in natural sunlight to increase the production of beneficial compounds.

Lifespan:

The Lifespan of the **ELPL-T5HO** tubes is slightly shorter than our **ELPL-T5HO** tubes at 10,000 to 12,000 hours. This is due to the degradation of the UVB phosphors over time. Depending on the photo-period used, we recommend replacing them every 12~14 months to maintain maximum output intensity.

Low ‘Heat Signature’:

The EconoLux **ELPL-T5HO-UV+** tubes operate at temperatures of around 40C (104F), **much lower than the temperatures found in Metal Halide (MH) and High Pressure Sodium (HPS) Lamps**. The low **ELPL-T5HO** operating temperatures provide benefits such as:

- **Improved moisture control** and a **reduced need for watering and nutrients** due to **less evaporation**;
- Significantly **reduced heat damage** to sensitive shoots and buds at the tops of the plants;
- **Improved light ‘intensity’** as the **ELPL-T5HO** tubes can be **mounted closer to the plants**. Since light falls off with the square of the distance, the closer the grow/plant-lights can be

mounted to the vegetation (without damaging it), the **more light can be delivered**.

- **Cooling and ventilation cost savings** as the lamps and ballasts do not produce large amounts of heat like Metal Halide (MH) and High Pressure Sodium (HPS) Lamps.

Energy Savings:

When the EconoLux **ELPL-T5HO-UV+** series are used for UV light exposure, they produce more UV than the more commonly used "reptile lamps", thus less of the UV+ lamps have to be used, thereby saving energy.

Operational Flexibility:

The EconoLux **ELPL-T5HO** tubes give the grower extreme flexibility in the type and number of fixtures used, the amount of light delivered to the plants, readily available spare ballasts, mixing ELPL-T5HO tube types to customize the spectrum for your plants, and increasing coverage as needed, all at a low cost.

Green Technology:

The EconoLux **ELPL-T5HO** series of tubes **reduces energy consumption** in agricultural applications, thereby also **reducing CO₂ production from power generation**.

The **ELPL-T5HO** tubes uses **solid mercury amalgam** which is **more environmentally friendly than the liquid mercury** used in HPS and MH lamps. In the event of tube breakage, there is less local contamination and the mercury amalgam is easily recovered for recycling.



Product Cost:



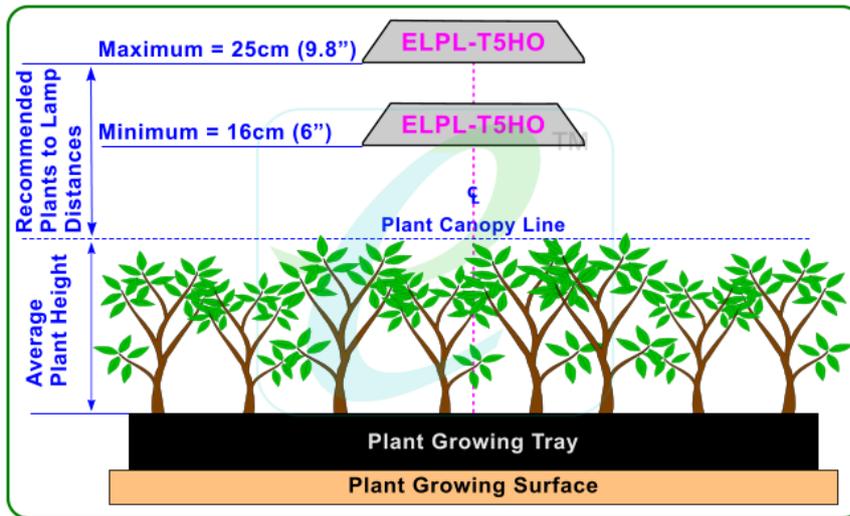
The EconoLux **ELPL-T5HO** plant/grow lights are a **purpose-designed, premium product**. They offer a choice of lamp spectra so you can tailor the lighting array to your plant's needs, and the UV+ models are cost competitive (on a UV light emitted basis) with the "reptile lamps" currently on the market.

Implementing the ELPL-T5HO Grow/Plant-Lights in Your Indoor Garden



The **ELPL-T5HO-UV+** series of plant-lights use standard T5HO lighting fixtures, which you can purchase locally or on-line (with the necessary electrical approvals). EconoLux recommends:

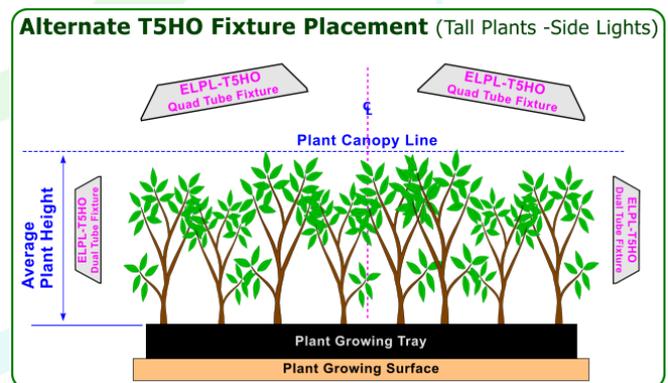
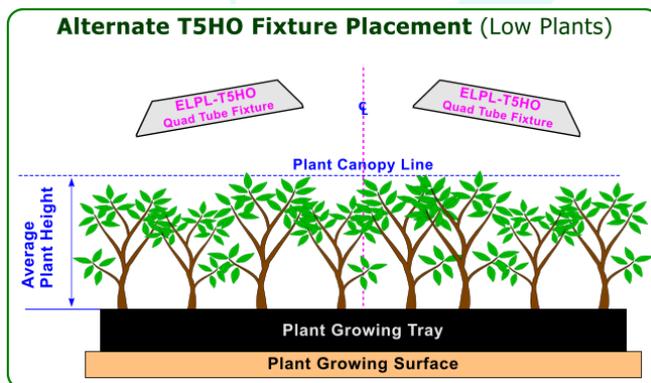
- T5HO fixtures that have **mirror/shiny type reflectors** are recommended so as to project the maximum light intensity downwards onto the plants below;
- **Avoid using T5HO fixtures that have glass or plastic fronts/diffusers** as these may filter out some wavelengths and will reduce the light intensity delivered to your plants.
- If ballast information is provided, **make sure the ballast can supply 450mA to each tube** to maximize **ELPL-T5HO-UV+** light output;
- The **recommended distance** between the bottom of the tubes, and the tops of the plants (plant canopy), should be **between 16 cm to 25 cm (6.3" to 9.8")** - see diagrams;
- The most desirable **ELPL-T5HO** mounting option is to have the fixture(s) suspended above the plants by means of **adjustable hangars** (sometimes called 'Yo-Yo' hangars or ratchet hangars) so that the height above the plant canopy can be changed as the plants grow. This keeps the distance between the bottom of the lamp, and the tops of the plants (plant canopy), within the **recommended distance of 16 to 25 cm (6.3 to 9.8")**.
- If keeping the **ELPL-T5HO** at the recommended distance from the plant canopy is not providing **enough light/coverage for all of the plants** you want to grow, don't raise the fixtures higher as that decreases the light energy to the plants. Instead, **add additional fixtures** and tubes to provide the proper coverage and/or light intensity;



- For taller plants, consider adding some dual or quad tube fixtures at the side(s) of the plants to improve coverage to the plant leaves that are not getting as much light from the overhead fixtures. The EconoLux ELPL-T5HO-UV+ tubes operate at low temperatures, so it is also possible to mount them between rows of plants.

You may need to experiment with the minimum distance between the lamps and the plant canopy, fixture spacing and placement, and side light or between row lights, to optimize your grow/plant lights for the type of crops you are cultivating.

Keeping the T5HO lamps close to the plants (without damaging the plants) is always better so as to deliver the maximum light intensity to the plants.



ELPL-T5HO-UV+ Exposure Times

Based on a survey of the scientific literature, a good starting point would be:

Number of lamps: We suggest that you use 2 of the ELPL-T5HO-UV+ 54W lamps per 1.2 X 1.2 meter (4 X 4 Ft) of plant growing area.

Plants in the Vegetative stage: 4 hours of exposure per day, 2 hours on each side of the “noon” of the photo-period. E.G.: If your photo period is 12 hours long, operate the ELPL-T5HO-UV+ lamps from 4 hours after the start of the photo-period, until 4 hours before the end of the photo-period.

Plants in the flowering phase: 6 hours of exposure per day, 3 hours on each side of the “noon” (middle) of the photo-period. E.G.: If your photo period is 12 hours long, operate the ELPL-T5HO-UV+ lamps from 3 hours after the start of the photo-period, until 3 hours before the end of the photo-period.

The above are guidelines only. You will need to experiment with the exposure times to find the best results according to the type/strain of plants you are growing.

Features Summary

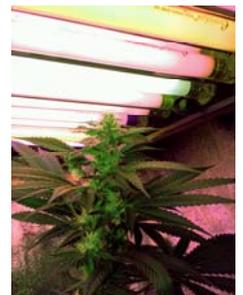


The EconoLux ELPL-T5HO-UV+ tubes are the world's first purpose-designed T5 Grow/Plant light tubes offering high UVB and UVA output for increasing resin production in Cannabis plants, or for developing colouration and beneficial compounds in plants such as red lettuce. These premium T5HO tubes are the product of years of extensive R&D, and are designed for a variety of agricultural applications where simulating natural sunlight is desirable.

Our advanced proprietary lamp coating, made from a blend of domestic and imported high-output phosphors, produces high UVB output of 12.5%, and high UVA output of 38.4% of the lamp's light output.

ELPL-T5HO-UV+ 54W High Output Fluorescent Grow/Plant-lights

- ▶ Spectral output curve maximizes UVB and UVA output;
 - Proprietary lamp coating outputs an average of over 12.5% UVB and 38+% UVA light
 - Light output is concentrated in the UV and dark blue areas of the spectrum where plants need it for increased resin or dietary carotenoid production
- ▶ Uses standard Dual tube, quad tube, 6 tube, and 8 tube T5HO lighting fixtures available locally;
 - Purchase off-the-shelf fixtures, with the right electrical approvals for your area
 - Spare parts and ballasts available locally, or on-line for overnight delivery
 - Configure combinations of fixtures to suit your needs and budget
 - Easily add more low-cost fixtures to increase light intensity or coverage area
 - Mix-&-Match with ELPL VG, FL and/or XR type tubes to customize the light spectrum for your plant's needs
- ▶ Low "heat signature" - saves on ventilation/cooling costs;
 - Low temperature allows close mounting above plants to maximize light intensity
 - Improved moisture control - reduce watering and nutrients due to less evaporation
 - Significantly reduced heat damage to sensitive shoots and buds at the tops of the plants
- ▶ Energy saving technology;
 - When ELPL-T5HO lamps are used to replace MH or HPS lamps, they can save between 20% and 45% on energy costs
 - Additional savings from reduced ventilation/cooling costs due to low heat output
- ▶ Environmentally friendly green technology;
- ▶ 2 year limited lamp warranty.



Technical Specifications



ELPL-T5HO - Standard T5 tube dimensions:

(LL) Lamp length	1,149.0 mm (45.23")
(TD) Tube Diameter	19.05 mm (0.749")
(B) Base (bi-pin)	G5
(EC) End-cap Colour Code:	Violet = UV+

Lamp Certifications:	CE RoHS (Hg)	Fixture Certifications:	According to local requirements (provided by fixture supplier)
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Parameter	Value	Notes
Nominal Wattage:	54 Watts/Tube	54.5W~55.1W with ballast overhead
Lamp Lifespan (Hours):	10,000 ~ 12,000 Hours	2 year limited lamp warranty
Average Lumen Output:*	N/A	Special purpose lamps which provide mostly UV light
Average PAR Output:*	N/A	Special purpose lamps which provide mostly UV light beyond the PAR range
Useful UV Light Output:*	12.5% UVB - 38.4% UVA	UVB = 275~320nm; UVA = 325~400nm
Temperature range:	15C ~ 40C	59F ~ 122F Ambient/Environment temperature

* Note: For details, please see test report on page 7.

BALLAST REQUIREMENTS (ELECTRONIC BALLASTS INCLUDED IN FIXTURES FROM LOCAL SOURCES)

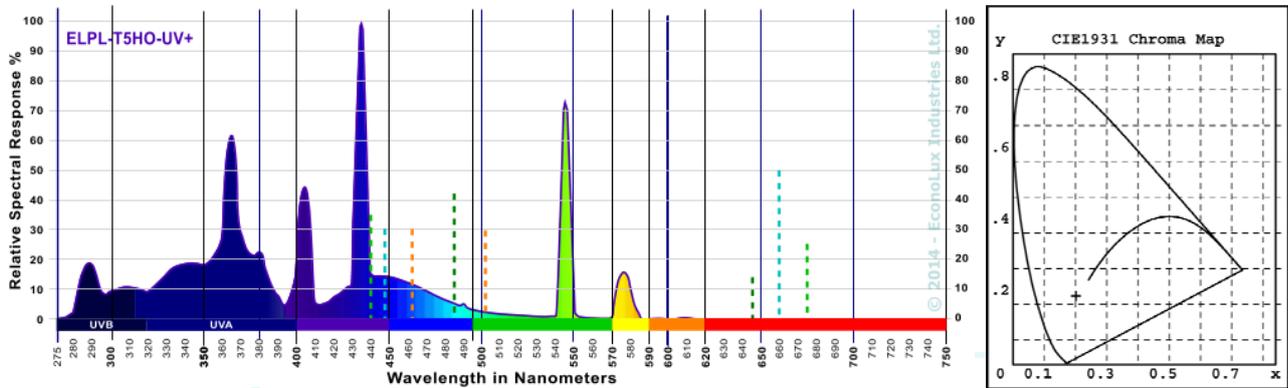
Fixture Type:	Standard T5HO Fixtures	Fixtures available from local vendors - Use fixtures with Mirror/Shiny reflectors & no glass or plastic lenses/diffusers for maximum light intensity
Electrical Certifications:	CE, UL, TUV, C-Tick, Etc.	Electrical Certifications provided by fixture vendor
Voltage - Hz:	110~277 VAC - 50/60 Hz	Voltage should match you local power source
Current Requirement:	450 mA/Tube	Use standard T5HO fixtures with electronic ballasts
Power Factor:	Cos phi = >0.97 ~ 0.99	Choose highest power factor available to save energy

Model Number	Description	Notes
ELPL-T5HO-UV+	54W T5HO Tubes - UV+ Type	For Increasing resin production or dietary carotenoid production in plants

Shipping:	CBM: Case of 100 tubes packed for export 121*24*20.0 cm - 0.0581 M ³ (3,345.9 In ³)	WEIGHT: Case of 100 tubes = 12.6 Kg (27.79 Lb) MOQ: 10 cases X 100 tubes = 126 Kg (277.9 Lb)
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NOTICE: Specifications & dimensions subject to change due to continuous product improvements

EconoLux ELPL-T5HO-UV+ 54W Plant/Grow Light - TEST REPORT



Color Parameters:

Chromaticity Coordinate: $x=0.2018$ $y=0.1924$
Chromaticity Coordinate: $u=0.1646$ $v=0.2353$
CCT: $T_c=25.000K$ **Dominant WL:** 435nm **Half Width:** 7.5nm
Red Ratio: $R=0.007$ **Render Index:** $R_a=99.0$
 $R1 = 6$ $R2 = -145$ $R3 = -195$ $R4 = -32$ $R5 = -82$ $R6 = -139$ $R7 = -96$
 $R8 = -31$ $R9 = -171$ $R10 = -662$ $R11 = -140$ $R12 = -217$ $R13 = -257$ $R14 = -195$

Photo Parameters:

Distance : 1.00m

Electrical Parameters:

Voltage: 117.7V **Current:** 0.460A **Power:** 53.8W **PF:** 0.980

EconoLux ELPL-T5HO-UV+ Grow/Plant-Light - Output Statistics	
Wavelengths (nanometers - nm)	Region Totals %
UVB (275nm to 320nm) % =	12.5%
UVA (325nm to 400nm) % =	38.4%
Blue (405nm to 495nm) % =	35%
Green (500nm to 565nm) % =	10.5%
Yellow & Orange (570nm to 620nm) % =	3.3%
Red (625nm to 750nm) % =	0.3%
Total Lamp Output % =	100.00%
PAR Curve Trough (535~575nm) percentage of Output =	10.9%
Useful light in PAR Curve Trough (535~575nm) AFTER discounting by 68.5% =	7.3%
Total ALL Blue (380~495nm) Output % =	73.4%
Total Usable Green (500~565nm after discounting by 68.5%) Output % =	3.2%
Total ALL Yellow to Red Output % =	3.6%

Instrument Status:

Scan Range: 270.0nm-700.0nm **Interval:** 5.0nm **Ip= 4** **ID: 25**
REF= 20880 - %: -0.158% **PMT HV:** -441v
Product: ELPL-T5HO-UV+ 54W **Manufacturer:** EconoLux Industries Ltd.
Ext. Temp: 17.5°C **Int. Temp:** 24.2°C **Humidity:** 65.1%
Test Operator: N. Yang **Date:** 2014-12-24 **Instrument:** CMS-2000

► The ELPL-UV+ lamps are for supplementary use in conjunction with other ELPL grow-lights.

Caution: The UV+ lamps are not suitable as the sole source of light to grow plants as they are deficient in blue and red light by design.

NOTICE: Specifications & dimensions subject to change due to continuous product improvements

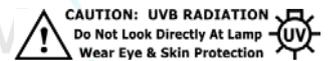
Appendix - Electrical and Other Certifications

The certifications on the ELPL-T5HO lamps have been verified and copies of the certificates are available to authorised EconoLux dealers/distributors on request.

The electrical and other certifications on fixtures used with the ELPL-T5HO lamps are provided by the factories who manufacture the fixtures and ballasts, or the fixture vendor. If you need copies of those certifications, contact the supplier or manufacturer of the fixtures you have selected.

IMPORTANT NOTES/WARNINGS:

- The ELPL-T5HO grow/plant-light products have **CE**, and **RoHS** certifications, it is **the responsibility of the purchaser to determine if these meet all the requirements for the location** where the products will be installed. Some jurisdictions may have **requirements for additional certifications and/or may require electrical or other inspections** of the grow/plant-light installation. **EconoLux Industries is not responsible** for any additional electrical, or other, certifications that may be required beyond those provided, or for any additional inspections.
- To avoid damage to the products, to mitigate electrical shock hazard, and for general safety, the **fixtures used with the ELPL-T5HO grow/plant-lights should be installed by a licensed electrician** or by other qualified personnel. It is generally safe to change the ELPL-T5HO tubes yourself but to mitigate electrical shocks, avoid coming into contact with the pins on the end of the tubes, or the lamp sockets.
- **NEVER** work on the wiring of ELPL-T5HO grow/plant-light products with the electrical power turned on, to avoid damaging the products and to avoid receiving **hazardous electrical shocks. ALWAYS turn off the power** at the fuse/breaker, or by unplugging the equipment, before doing any electrical work.
- **CAUTION:** The ELPL-T5HO-UV+ lamps emit UVB light which can cause skin and eye damage. Wear appropriate eye and skin protection when working around the lamps.



APPENDIX - Warranty Policy



While we strive for the highest quality, we recognize that it is impossible to make a perfect product. In the event of any defect in manufacturing or workmanship, we will replace the defective lamp/tube subject to our prevailing warranty policy in effect at the time the problem is discovered.

EconoLux Industries Ltd., provides a two (2) year limited warranty on our ELPL-T5HO series Grow/Plant-light tubes. Warranty is from the date of shipment of the lamps from the factory.

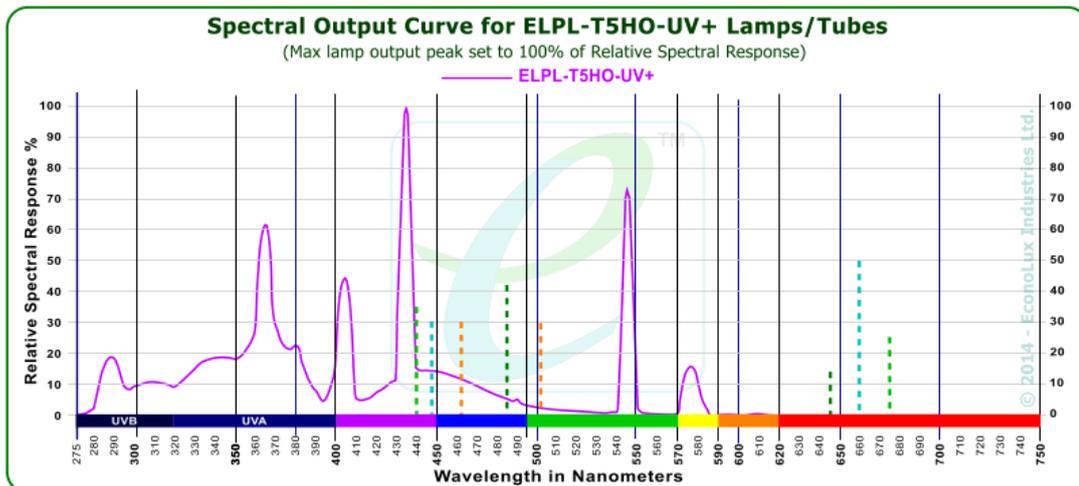
Basic terms and conditions:

- The products were inspected and in good working order when they left the factory. The **warranty does NOT cover breakage, loss or damage to the products in shipment** - please contact your carrier for compensation caused by any shipping loss or damage;
- **Shipping/freight insurance is the responsibility of the purchaser;**
- Normal packaging is in heavy duty, double walled cardboard cartons. **Optional plywood case**, or wood framing of cartons, is available for extra protection, at an additional fee;
- **Warranty does NOT cover damage to the products** caused by you, and/or the end-user, where such damage is from mishandling, dropping, crushing, deforming, puncturing, or otherwise physically damaging the products;
- **Warranty does NOT cover misuse or abuse** of the products such as applying incorrect voltage, incorrect electrical wiring, failure to properly ground the equipment, failure to properly mount/install the products, modification of the products, or any other activity related to the use or installation of EconoLux products which is not directly under EconoLux's control;
- **There is NO warranty, expressed or implied**, as to the merchantability or fitness for purpose of any of the ELPL-T5HO series products, or any add-on or accessory products;
- In the case of defective product that is not caused by shipping/freight, or user damage, abuse, or mishandling, and is **the result of a manufacturing defect, we will replace the product** with the identical type/model/wattage of product **at no charge. Warranty replacement of lamps is at EconoLux's sole discretion.** In the event of failure of the product, you will be required to submit a claim form, and high quality photos to support your warranty replacement request;
- We may require certain components/parts to be **returned to our factory as proof of product failure**, and for examination and diagnosis before determining the eligibility for warranty replacement;
- You are responsible for the cost of shipping the parts/components required for proof of product failure to us, and you are responsible for the cost of shipping the free warranty replacement product to your location;
- **Authorized EconoLux dealers/distributors carry warranty replacements in stock** and are responsible for providing warranty service to their customers. In the event of a problem with your EconoLux product, you must contact the authorised dealer/distributor/re-seller who provided you with the product(s) for repairs or replacement. You should only contact the factory if you purchased the product(s) directly from the factory (are an authorised EconoLux dealer/distributor/re-seller).

ELPL-T5HO-UV+ Supplementary UV lighting to increase beneficial compound production

The EconoLux Industries ELPL-T5HO UV+ series of energy saving T5 High Output Plant/Grow-lights are the world's first purpose-designed T5HO lamps for exposing plants to the UVA and UVB light they would naturally receive if they were growing outdoors. Exposure to UVA and UVB light from supplementary lamps can help to simulate the effects of natural sunshine on indoor plants, increasing the plant's production of medicinal compounds, and beneficial anti-oxidants.

Below is a graph showing the output spectrum of the ELPL-T5HO-UV+ supplementary plant/grow lighting:



SUMMARY



The purpose-designed ELPL-T5HO-UV+ series of grow/plant-lights offer high UVB and UVA output to supplement other grow/plant lights. They assist in mimicking natural sunlight, which can increase resin and other beneficial compound production in plants. The T5HO-UV+ lamps/tubes meet your needs and budget, at a **reasonable price**, and they can **improved crop yield and quality**.

The ELPL-T5HO series of grow/plant-light tubes are **more energy efficient and affordable** than many other types of agricultural lights, making them an **ideal choice for all of your grow lighting applications**.

Your Authorised EconoLux Industries ELPL Plant-light Distributor:



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