LIGHT FOR SELF-SUFFICIENCY

MODUS®
CZECH MANUFACTURER OF LIGHTING FITTINGS

developed and manufactured
in the Czech Republic

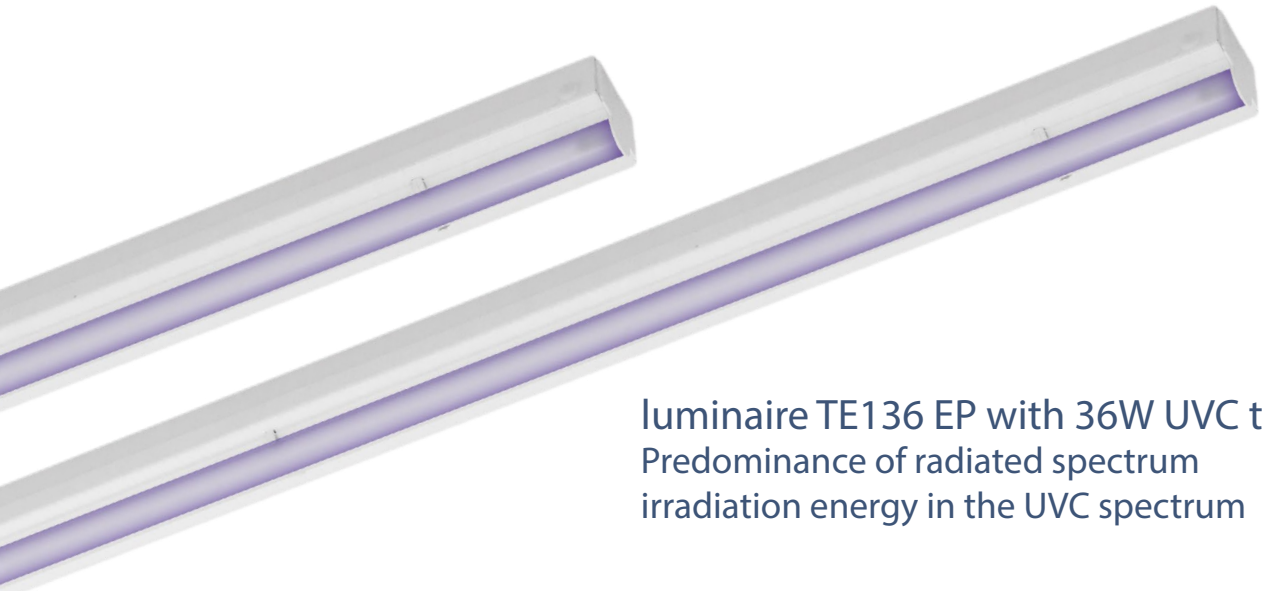
DISINFECTING

CULTIVATE

RESIST

MODUS TE UVC

Germicide luminaire for contaminated surfaces



luminaire TE136 EP with 36W UVC tube

Predominance of radiated spectrum	$\lambda = 250\ nm$
irradiation energy in the UVC spectrum	$E = 110\ \mu W/cm^2$

ATTENTION! ATTENTION! ATTENTION!
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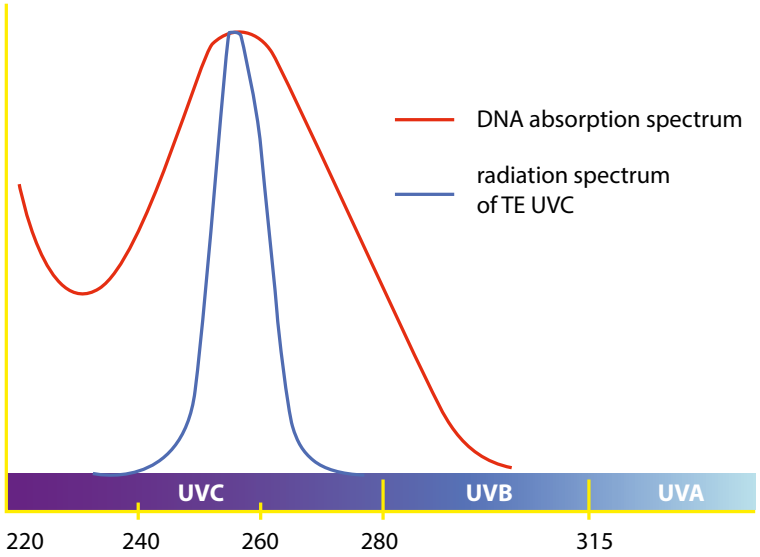
When using UVC luminaires, it is always necessary to avoid direct contact with people and animals!

Never expose yourself to UVC radiation!

The UVC spectrum is used as a more radical and, ultimately, more economical solution in disinfection care for - nowadays not only - hazardous areas. It is gradually becoming the standard in many different areas of human work and life. Examples of areas using UVC radiation:

Hospitals and laboratories
Pools
aquaristic
Terraristics
Breeding and cultivation
dairy industring
Brewing
Gastronomy
Packaging industry
Ventilation system
Water treatment
Changing rooms
Treatment of bedding
Households



The **dose of irradiation** to inactivate various microorganisms is proportionally dependent on their size and is expressed in mJ/cm^2. While a dose of up to 40 mJ/cm^2 1-10 μm is sufficient to deactivate 1-10 μm, we need to provide a dose of up to 400 mJ/cm^2 to deactivate 100 μm mold.
The relationship between time (t), radiation energy (E) and dose (H) is given by a simple relation

$$H = E * t$$

If we know the dose needed to inactivate a particular organism, we can easily determine the time it takes to irradiate according to how powerful the lamp is by using this formula.
However, in conventional laboratory practice, it is customary to irradiate a potentially contaminated surface half an hour before work and half an hour after work, a time that is several times greater than the time required to inactivate most microorganisms.

Invisible but powerful

The UVC spectral region belongs to the wavelengths from 200 to 300 *nm*, so it is located in front of the visible spectrum. Its **unique strong germicidal effects** are due to the fact that the nucleic acids (DNA or RNA) of organisms (irrespective of whether they are **viruses, bacteria, protozoa, mites, spores** etc.) have the highest radiation absorption capacity in the region of about 250 *nm*. . The energy of the absorbed radiation causes irreversible changes in the binding of adjacent nucleic acids - in particular, thymine dimerization is naturally the most common photochemical damage that will **prevent the organism from replicating and acting infectiously.**

Treats air and surface

UVC radiation **does not penetrate deep through solids**, thus affecting the irradiated surfaces as well as the surrounding air. It is also often used to **disinfect water** for which radiation is permeable, but it is important to take into account its hardness and turbidity these variables significantly affect the transmittance to UVC radiation.

If our goal is to disinfect the entire room with UVC radiation, it is advantageous to follow the cross table, which is designed for 36W UVC lamp and ceiling height from 2.7 to 3.0 *m*.

		length of the room						
	metry	3,0-4,0	4,0-5,5	5,5-7,0	7,0-9,5	9,5-11,5	11,5-14,0	14,0-17,5
room width	3,0-4,0	1	1	2	3	4	5	6
	4,0-5,5		2	2	4	5	6	7
	5,5-7,0			3	5	6	7	8
	7,0-9,5				6	7	8	9
	9,5-11,5					8	9	10
	11,5-14,0						10	11

cross table to determine the number of luminaires depending on the size of the space



MODUS RX PLANTA

Luminaire supporting plant growth

Spectral characteristics of used chips
450 *nm* - deep blue
660 *nm* - hyper red

RX PLANTA represents a new generation of lighting for growers, which differs from previously used sodium lamps with significantly higher efficiency at several levels:

The spectral characteristic is adapted to the needs of the plant. This makes it significantly stronger and more fertile.

The entire plant cycle is faster, so it allows more harvests when compared to HPS.

The power consumption is approximately twice as low with the same efficiency.

Fruits grown under this special LED lighting have a distinctive natural taste and natural color.

Day 20

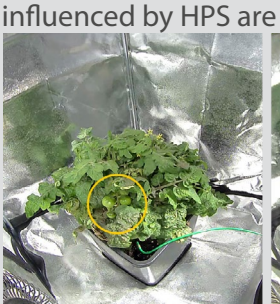
Even in such young plants, the differences in leaf density begin to be apparent. Tomatoes lit by RX PLANTA are still higher, although they will continue to focus their growth to „core“

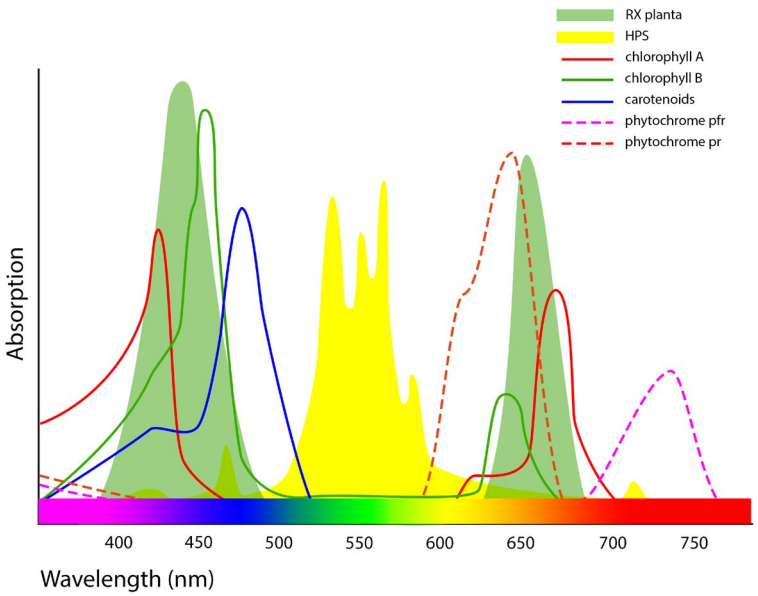
Day 45

Tomatoes under the influence of RX PLANTA are richly planted with flowers. The plant is strong and compact. Tomatoes under the influence of HPS stretch to the height, yet without flowers.

Day 65

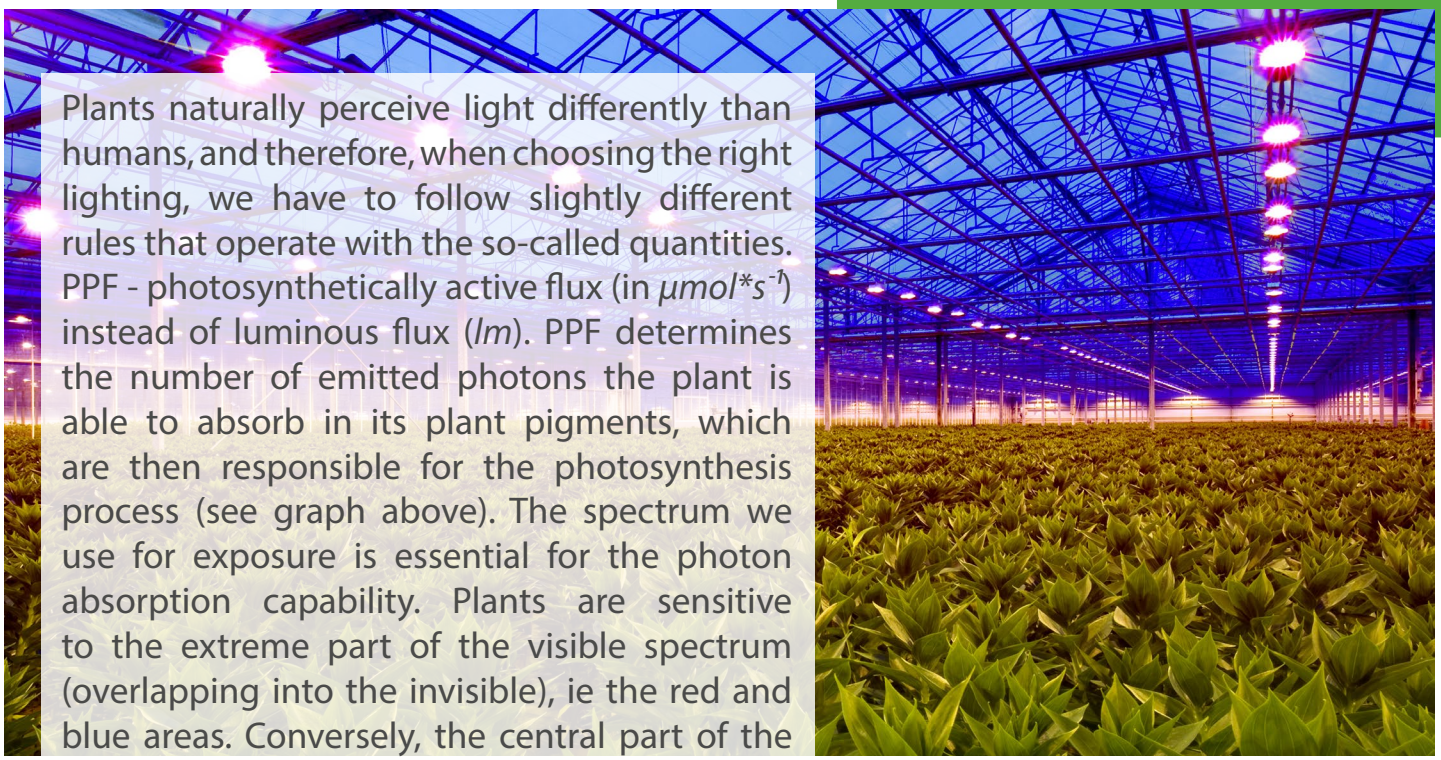
In tomatoes influence the first fruit ripens in plant, the plant is surrounded by new f influenced by HPS are s





Strength of extreme regions

For the plants, the extreme regions of photosynthetically active radiation are particularly important. Radiation in the ‚blue' part of the spectrum (450 nm) promotes plant growth in particular, while radiation in the ‚red' part (650 nm) of the spectrum promotes the development of flowers and fruits. **We chose the ratio of chips so that it is not necessary to change the ratio of spectra during the whole growth cycle of the plant**, so the luminaire is not only efficient but also user friendly.



Plants naturally perceive light differently than humans, and therefore, when choosing the right lighting, we have to follow slightly different rules that operate with the so-called quantities. PPF - photosynthetically active flux (in $\mu mol*s^{-1}$) instead of luminous flux (*lm*). PPF determines the number of emitted photons the plant is able to absorb in its plant pigments, which are then responsible for the photosynthesis process (see graph above). The spectrum we use for exposure is essential for the photon absorption capability. Plants are sensitive to the extreme part of the visible spectrum (overlapping into the invisible), ie the red and blue areas. Conversely, the central part of the spectrum (the green area) reflects uselessly. That is why, using a suitable spectrum, we can achieve perfect cultivation results even with significantly lower luminous wattage.

	Power input (*W*)	PPW (*µmol/s*)	efficiency (*PPW/W*)
RX PLANTA 200 W	**192**	**450**	**2,34**
Stnd. HPS 250W	**250**	**252**	**1,05**

The table shows that the efficiency of the "tuned luminaire" is more than twice as high in PPF as compared to HPS, but our experience shows that in fact this difference is even more noticeable.

Day 80

ed by RX PLANTA, n the core of the further densely lowers. Tomatoes till flowersless.

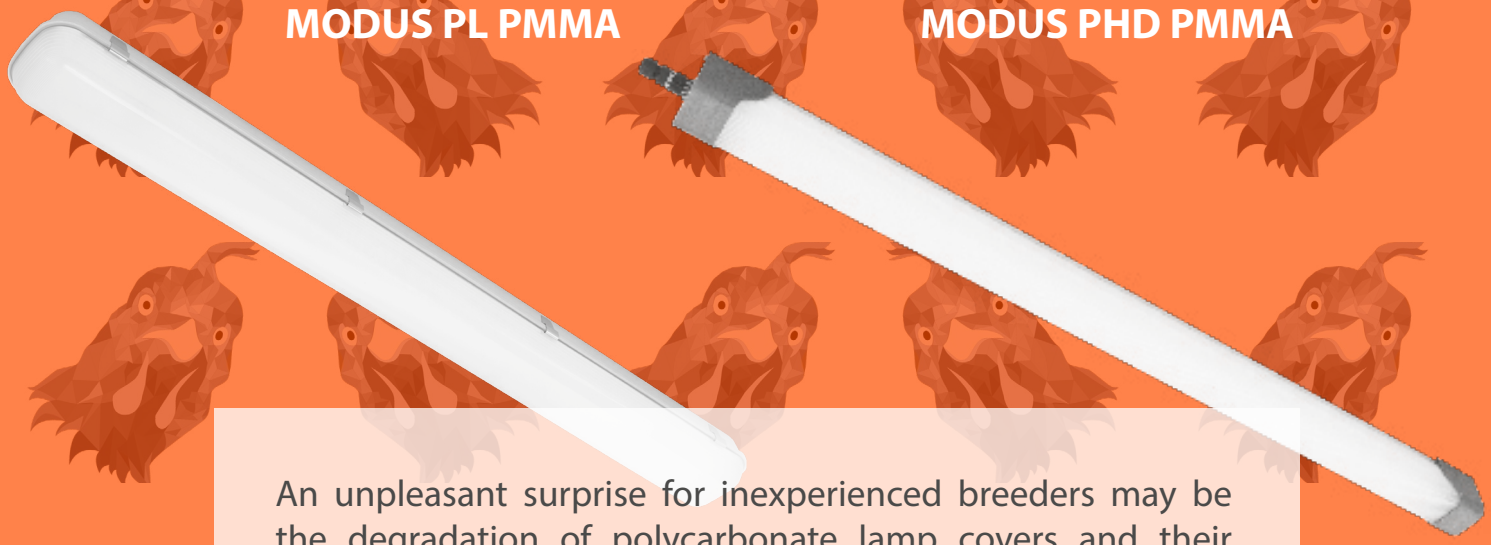
The first fruit ripened in tomatoes illuminated by RX PLANTA.The plant is filled with still immature fruits and flowers. Tomatoes under the influence of HPS have several flowers.

MODUS luminaires for agriculture

ser of luminaires with PMMA cover

MODUS PL PMMA

MODUS PHD PMMA



An unpleasant surprise for inexperienced breeders may be the degradation of polycarbonate lamp covers and their subsequent rapid destruction. This is due to the fact that **polycarbonate degrades on contact with ammonia, which is high in breeding objects**. Fortunately, the solution is simple, just use the **polystyrene cover (PMMA)**, which we offer as a variant for many of our standard luminaires.

And because the real quality is the sum of the details, we choose all the other materials for production so as to guarantee **not only chemical but also mechanical resistance**. That is why we use, for example, **metal clamps** for covers instead of the commonly used plastic ones that we commonly encounter on the market.