



THE DUTCH POWERHOUSES FOR CANNABIS

VERTICAL | INDOOR | GREENHOUSE

BENEFITS OF WATER-COOLED LEDS FOR CANNABIS CULTIVATION



CLIMATE CONTROL

The maximum light intensity in a growing area is often limited by the ability to get enough cool air to flow without disturbing the plants. The elimination of heat is one of the most common and difficult issues cannabis cultivators face with artificial lighting. Actively water-cooled LED fixtures offer many advantages for the plant as well as economically.

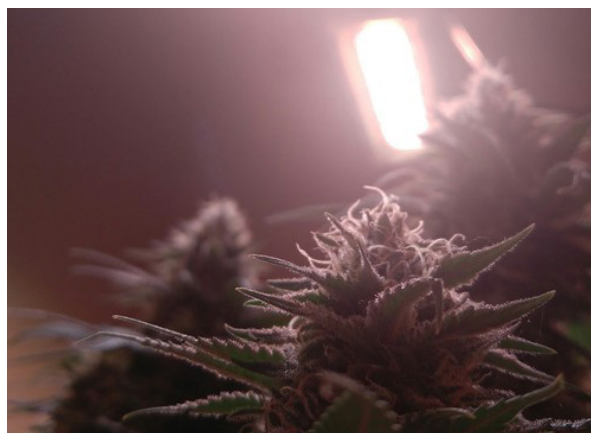
SCREENING FOR LIGHT POLLUTION

Light pollution from greenhouses is being restricted more often. Growers have to close screens, sidewalls, and end walls during the evening and night which creates technical challenges. Temperature and humidity levels increase beneath a screen that is intended to reflect light and prevent transmission to the sky. With actively water-cooled LED fixtures, a significant amount of heat is extracted out of the growing area.



LESS CONDENSATION AND MOISTURE IN FLOWERS

Plants love a balanced climate. With a sudden drop in temperature (e.g. when lights are turned off) plants go into night mode. The temperature of the heads / flowers of the plant change rapidly: the humidity from the air condenses and descends. Moist in the flowers exposes them to fungi. The water cooling of the LEDs ensures a stable temperature and therefore a better controllable air RH and no moisture in the flowers.



INDOOR HVAC SAVINGS

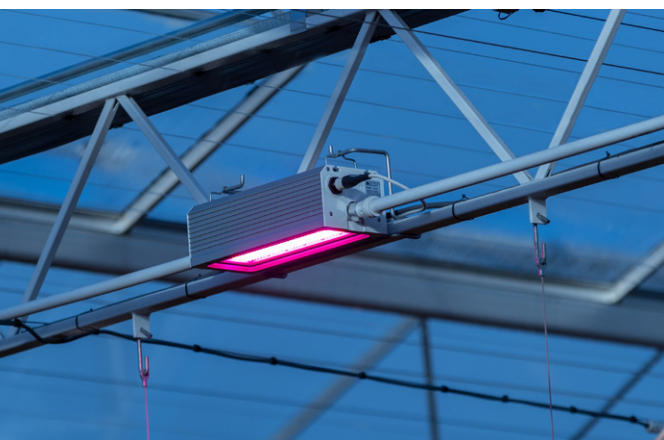
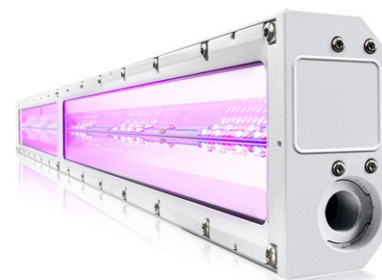
In an indoor growing facility a significant part of the project costs is taken up by the costs of cooling, because excessive heat needs to be removed. With Oreon's water cooling solution, the fixture's heat is removed from the room to save on operational costs and on the investment of an HVAC installation. This can add up to 50 USD savings per fixture per year.

LIGHT OUTPUT

Oreon's LED fixtures operate on active water cooling, where the heat of the fixture is transported away from the fixture and out of the growing area. This technology makes it possible to fit more LEDs into one fixture, in order to achieve a higher light output with fewer fixtures.

TAILOR MADE SPECTRUM

The right combination of white, red and blue LEDs ensures that the cannabis crop is shorter and more compact, has more branching and improved potency of THC/CBD. The Oreon multi-layer fixture Embrace has a control functionality which enables the spectrum and light intensity to be adjusted dynamically. Growers can change the spectrum and the amount of light on the crop at any given time.



HIGH LIGHT UNIFORMITY

Thanks to the extremely high light levels and wide beam angles of our LED grow lights, fewer fixtures are needed in a greenhouse or growing facility to reach high light uniformity. In a 250 m² facility (2,690 ft²), only 80 Monarch fixtures are needed to illuminate the crop with 1000 $\mu\text{mol/s}$. In this example one Monarch fixture can cover a surface area of 3 m² (32 ft²).

BEST PRICE PER MICROMOLE

All advantages eventually lead to lower operating expenses and therefor the best price per micromole. To sum up:

- LEDs and electronic parts stay cool, which ensures a consistent light output and longer lifespan;
- high light output and uniformity with fewer fixtures;
- more control over climate results in more daily lighting hours;
- no ventilation needed, CO₂ and unpleasant odors stay inside;
- lower cooling costs;
- all the energy that is not converted into light is led away and can be reused.

REFERENCE CASE: MEDISUN

Medisun Inc. produces medicinal cannabis in greenhouses covering over 800,000 sq.ft in Ontario, Canada. They use Oreon's LED lights, which is one of the main factors that allows them to grow a crop of high quality. This results in a short and more compact crop as well as shortening of crop sequences.

COO Laust Dam: "The HTC levels are 2-4% higher, we have 10% more yield and the flowering time is 5-7 days shorter than with HPS."



COLLABORATIONS



Member of the **LCC**
Legal Cannabis Coalition

WATER-COOLED LED FIXTURES



MONARCH

Top light fixture
Indoor & greenhouses
Available height > 150 cm / 59"
Max. 4020 $\mu\text{mol/s}$ | 3.6 $\mu\text{mol/J}$

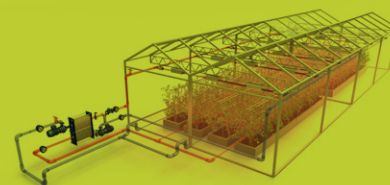
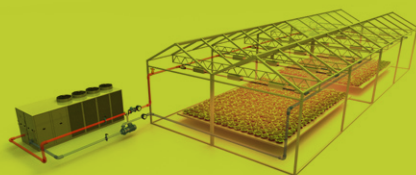
Ideal for cannabis cultivation in a greenhouse or indoor facility where the available height between crop and fixture is more than 1.5 m. An existing HPS fixture can be replaced 1-for-1, resulting in 93% more light with the same energy consumption, or more than 45% savings on energy costs with the same light intensity.

EMBRACE

Multi-layer fixture
Indoor & vertical farming
Available height < 150 cm / 59"
Max. 700 $\mu\text{mol/s}$ | 3.7 $\mu\text{mol/J}$

The Embrace can illuminate a large surface area with little height. The light can be dimmed and the spectrum dynamically adjusted to adapt perfectly to different phases of growth. In these types of cultivation, stable heat and humidity are very important. An actively water-cooled LED fixture is the solution for a stable growing climate.

WATER COOLING EXPLAINED



Oreon has developed a water cooling technology that can be used in almost any greenhouse or indoor facility. The water cooling system usually consists of 2 water circuits separated by a heat exchanger. The first circuit provides a constant flow of water between the heat exchanger and the fixtures. Cool water is pumped to the fixtures where the water extracts the excess heat from the lamps. The hot water flows back to the heat exchanger, where it is cooled by the second circuit.

The water from the second circuit can come from a basin, but can also be actively cooled by a dry-air cooler (image 1), an HVAC or a silo. The heat gained from the fixtures has a maximum temperature of 45°C and can also be reused. There are several options to directly benefit the crop; the heat can be reused directly under the grow bench, in grow pipes between the crop (image 2). In addition, growers often use the gained heat to heat the spray water for the plants or the water in hydroponic ponds. Another option is to store the extracted heat undergrounds, to heat the greenhouse or other business premises in the winter. The full energy of the lamp is used in this way.

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