

# SPECTRA TUNE 7!



## Spectrally tunable downlight

Q2 - 2020

DS450007-02

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### DESCRIPTION

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The SPECTRA TUNE 7! is a spectrally tunable LED downlight designed for general lighting for specific applications (Retail, Office, Wellness). The system has been designed to deliver white light from the modulation of each of its different wavelength channels. Brightness can be dimmed down to 10% for each channel individually or the whole white light.

The SPECTRA TUNE 7! is equipped with 7 different types of colored LEDs.

LEDMOTIVE patented technology warrants color precision and accuracy as well as color stability over time, through a CMOS-based onboard sensor.

The system can playback programmed spectra sequences over time, dynamically modifying the spectral components and atmosphere present in the indoor enclosed space environment.

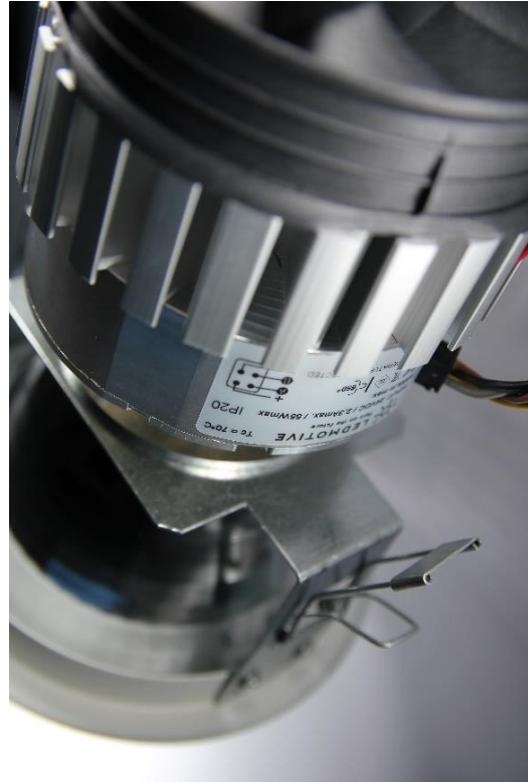


Figure 1. SPECTRA TUNE 7!

### SPECTRA TUNE 7! - Features

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- High power multi spectral LED light engine
  - Independent color channel brightness adjustment
  - Precise, accurate and stable light emission
    - Default wired communications based on an EIA-485
  - using the LIGHT HUB device
    - $\mu$ WAVE software with basic operation controls
    - RESTful API available for full programming flexibility
    - Multiple SPECTRA TUNE 7! Device
  - operation (up to 128 or more\*)
    - Optional: IP65 front glass
- \*\*depending on the amount of traffic information exchanged

## LED ENGINE CONFIGURATION

The SPECTRA TUNE 7! contains seven LED channels for multispectral reproduction. The characterization of each LED is shown in Table 1 and Figure 2\*

| Channel | Color      | Peak Emission (nm) | Radiometric value (W) | Photometric value(lm) | FWHM (nm) |
|---------|------------|--------------------|-----------------------|-----------------------|-----------|
| CH 1    | Royal Blue | 455                | 1.6                   | 61                    | 20        |
| CH 2    | Blue       | 470                | 17                    | 154                   | 29        |
| CH 3    | Cyan       | 495                | 2.2                   | 526                   | 29        |
| CH 4    | Green      | 520                | 1.2                   | 599                   | 33        |
| CH 5    | Lime       | 545                | 4.1                   | 1904                  | 110       |
| CH 6    | PC Amber   | 595                | 2.5                   | 920                   | 78        |
| CH 7    | Red        | 635                | 1.5                   | 296                   | 19        |

Table 1. Generic features of the SPECTRA TUNE 7! light engine

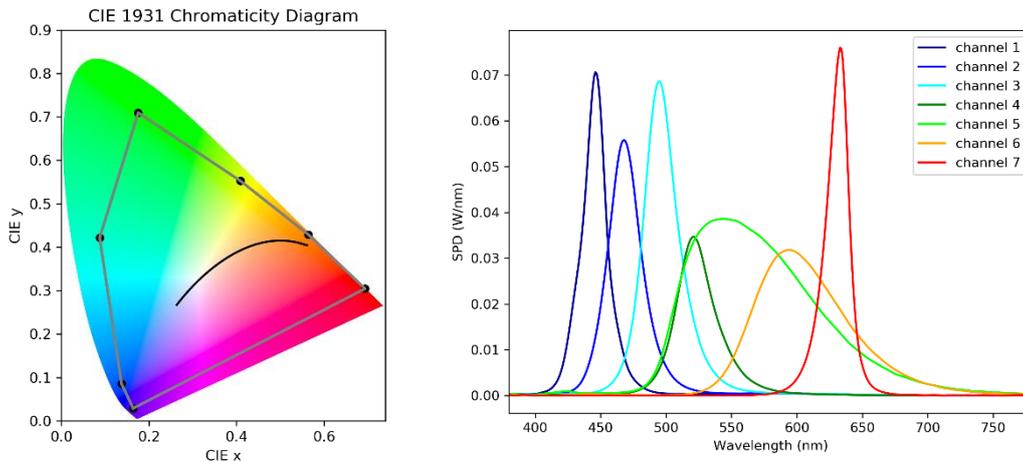


Figure 2. (left) CIE 1931 xy coordinates of the 7 channels that define the color gamut and (right) Spectral Power Distributions (SPDs) of each LED channel

\* Measured at 25°C. Dominant wavelength and amplitude of some channel may vary slightly depending on bin availability at the moment of the manufacturing; however, the individual calibration of each SPECTRA TUNE 7! would be taken in account internally to correct any eventual deviation and produce the desired spectrum.

Since the light output of the SPECTRA TUNE 7! is generated by mixing up to 10 wavelength (color) channels, every spectrum is determined by independent pulse width modulation (PWM) signals. Consequently, the luminous flux is not constant across the 1931 CIE diagram. All active channels are mixed, providing with a smooth (uniform in color) light.

### SPECTRAL MODULATION

Figure 3 shows the product performance based on two different spectral modulations<sup>1</sup> that reproduce a blackbody radiation curve at two different temperatures such as 2700 K and 6500 K

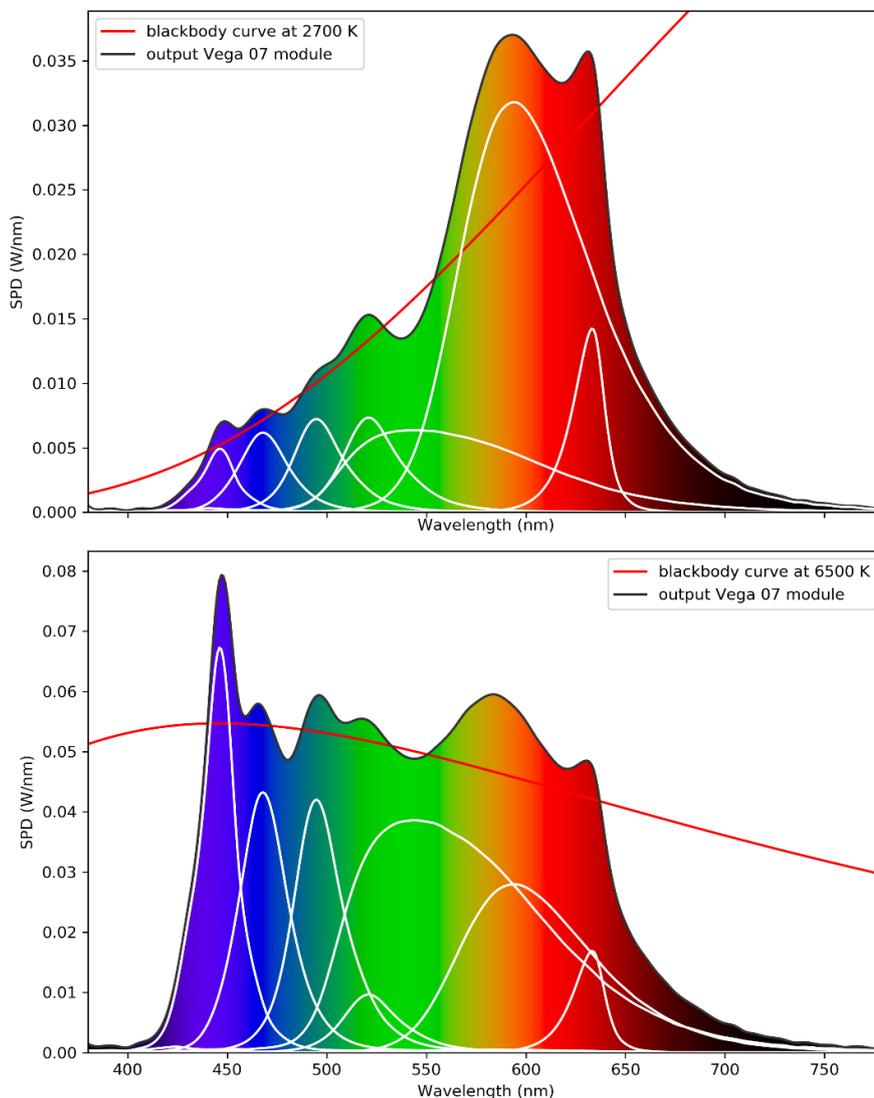


Figure 3. Example of two different spectral fittings using a blackbody radiation at 2700 K and 6500 K

<sup>1</sup> Calculations are based using LEDMOTIVE proprietary software (MOTO and CYCLO)

### SPECTRAL SWITCHING TIME

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The SPECTRA TUNE 7! works in synchronous mode by default with the LIGHT HUB. In this mode, the luminaire acknowledges every command received from the LIGHT HUB before a new instruction can be received so that “collisions” between messages can be detected and duly corrected.

The commands programmed in the  $\mu$ WAVE software are in synchronous mode. Typical response times in this mode is few hundreds of milliseconds and it corresponds with the minimum spectral switching time.

Whenever a specific application requires for fast switching times, the SPECTRA TUNE 7! can be set to work in asynchronous mode. In this case, the SPECTRA TUNE 7! does not send an acknowledge receipt to the LIGHT HUB, making it possible fast spectral sequences. The typical average time between consecutive spectra in asynchronous mode is around 10 milliseconds (100 different spectra for every second).

### THERMAL PROTECTION

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The SPECTRA TUNE 7! incorporates a temperature protection control that is enabled by default. In the unlikely event of PCB overheating (fan or dissipation failure, harsh environments, etc.), the LED module will automatically reduce its luminous flux and consequently the consumed electrical power to keep the temperature within a safety range. In this way, the optimal working conditions that warrant the lifespan of the LED engine and its components are always preserved.

### ELECTRICAL SPECIFICATIONS

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|                                   |                                   |
|-----------------------------------|-----------------------------------|
| Nominal Input Voltage             | 100-270 V AC 50/60 Hz             |
| Max. Input Power                  | 80 W                              |
| Max. Input Current                | 3.3 A*                            |
| Power and data connector          | MOLEX 43025-0409                  |
| Data communication (A, B) control | LED MOTIVE proprietary protocol** |

\* fuse protection at 4.0 A

\*\* based on a communication bus EIA-485 (also known as RS-485)

For details of the wiring please check the latest revision of the VEGA07 data sheet ref. **DS450005**

**OPTIONAL: IP65 GLASS PROTECTION**

LEDMOTIVE can provide, optionally, a transparent glass protector and a rubber O-ring that warrants a frontal with IP65

**LIGHTING LEVELS – INSTALLATION PROPER DIMENSIONING**

As in every lighting installation, light intensity levels on the specific room where the SPECTRA TUNE 7! is going to be installed will depend on several parameters such as dimensions, wall painted colors, furniture, presence of natural light, materials, etc.



Figure 4. Lighting simulation of a residential bedroom

The following table may be used as a quick guide to calculate the number of SPECTRA TUNE 7! luminaires that would be needed for a specific application, depending on the room dimensions and the desired maximum illuminance levels required for the research undergone<sup>2</sup>:

|                   | 300 lx | 500 lx | 1000 lx |
|-------------------|--------|--------|---------|
| 8 m <sup>2</sup>  | 4      | 4      | 8       |
| 12 m <sup>2</sup> | 4      | 6      | 12      |
| 16 m <sup>2</sup> | 6      | 8      | 16      |

Table 2. Quick calculation of number of luminaires required as a function of illuminance and room dimensions

<sup>2</sup> This table should be considered as a rough approximation, not contractual data. Calculations have been done for a rectangular room with a simple furniture equipment, 2.5 m ceiling height, with no natural or additional light sources and with a regular maintenance and cleaning policy.

## CONTROL SOFTWARE

With a single or a group of SPECTRA TUNE 7! a  $\mu$ WAVE software is provided for windows (PC or Laptop) version in order to control the lighting system. For research applications that need advanced programmatic functionalities please check the optional RESTful API

The  $\mu$ WAVE provides with basic functionalities as can be shown in Figure 5.

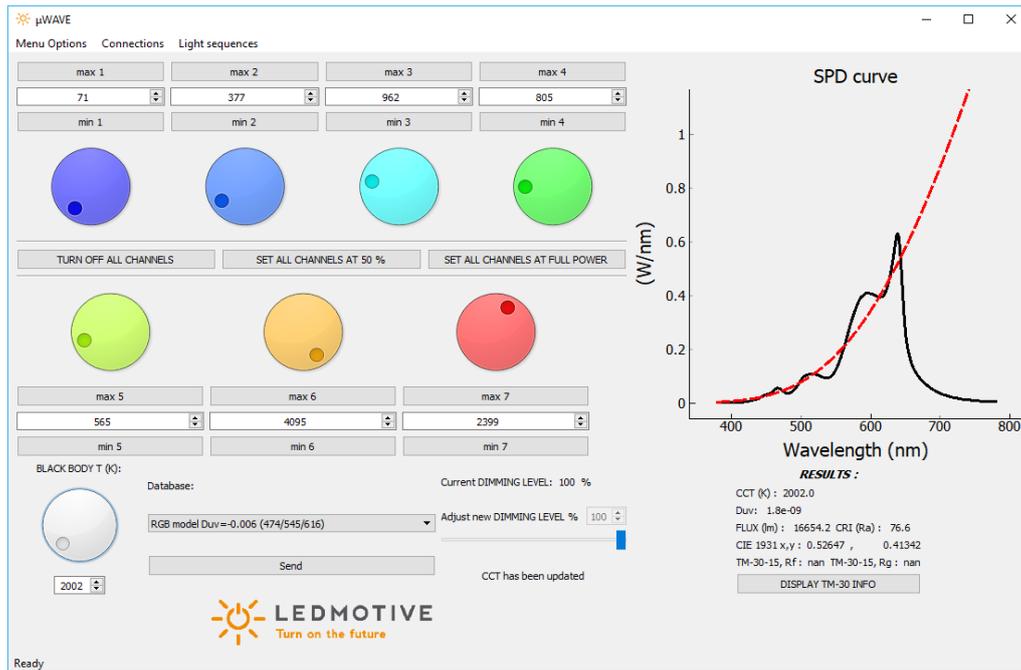


Figure 5. Screenshot of the  $\mu$ WAVE software

### Computer requirements:

- 64-bit Operating System
- Windows version; preferred WIN 8 and above

### Features:

- Change the amplitude of each channel to design a specific spectrum
- Brightness adjustment
- Save and import light spectra
- Correlated Color Temperature (CCT) selection
- Playback spectrum from a spectral database
- Create, save and reproduce light sequences (dynamic streaming of light spectra) by adding different spectrum to a sequence pool

### OPTIONAL: RESTful API

To provide the user with full programming flexibility in the operation of the SPECTRA TUNE 7!, a RESTful API is available for the LIGHT HUB. The LIGHT HUB can be accessed using the HTTP protocol under any programming language (C, C++, C#, Python, MATLAB, Java, JavaScript, etc.).

Some additional information can be found in the LIGHT HUB data sheet Ref. **DS450002**

### PRODUCT PARTS

The SPECTRA TUNE 7! includes the following hardware and software items:

- Spectrally tunable LED downlight luminaire
- Power supply (from 110 – 240 V A/V to 24 V D/C)
- $\mu$ WAVE Software

NOT INCLUDED:

- LIGHT HUB and power supply
- Ethernet cable (to connect the LIGHT HUB to the LAN router)
- EIA485 communications cable and wiring

OPTIONAL:

- IP65 glass protector
- RESTful API

### INSTALLATION LAYOUT

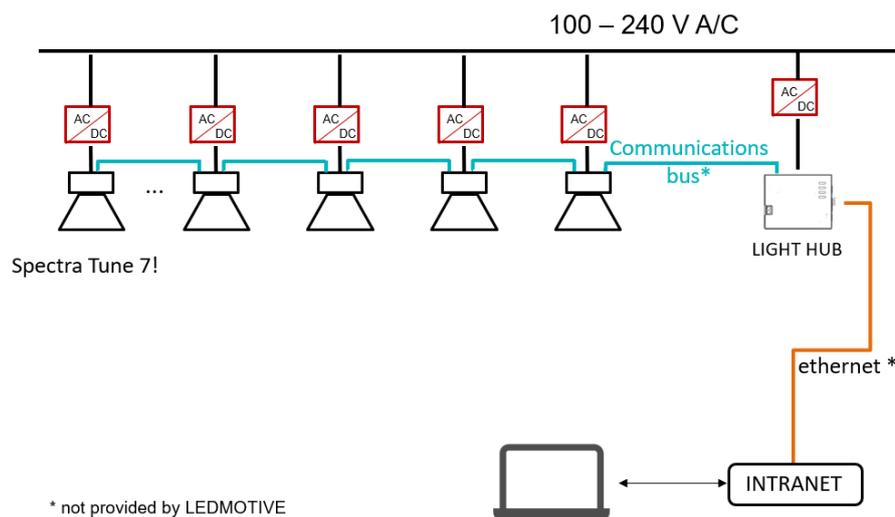


Figure 6. Example of an electrical and bus communication layout

Figure 6 shows an example of an electrical connection and the bus communication layout in a daisy chain configuration.

If you need further information about electrical connections or how to build the communication bus an Application Note (**AN470010**) is available upon request. Please contact us for additional information.

### FEATURES - SUMMARY

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|  |                                |
|--|--------------------------------|
| <b>Source type</b>                       | Multiple high-power LED        |
| <b>Max Luminous Flux</b>                 | 3400 lumens <sup>3</sup>       |
| <b>Spectral range</b>                    | 420-730 nm                     |
| <b>Operating temperature range</b>       | 0 °C to +35 °C                 |
| <b>Synchronous operation mode speed</b>  | 250 milliseconds               |
| <b>Feedback control loop</b>             | Enabled by default             |
| <b>Nominal Input voltage</b>             | 24 V DC (Constant voltage)     |
| <b>Max Input current</b>                 | 3.3 A                          |
| <b>Max Input Power</b>                   | 80 W                           |
| <b>Communications protocol</b>           | bus EIA-485                    |
| <b>Control software</b>                  | FREE μWAVE Software©           |
| <b>IP</b>                                | 20                             |
| <b>Insolation Class</b>                  | Class II                       |
| <b>OPTIONAL</b>                          |                                |
| <b>Frontal IP65</b>                      | Transparent Glass              |
| <b>Advanced control</b>                  | RESTful API                    |
| <b>Asynchronous operation mode speed</b> | 10 milliseconds (API required) |

<sup>3</sup> Values may change slightly depending on the currently available LED binning



## MAINTENANCE & SERVICE

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- If a fingerprint mark or dirt is observed at the diffuser or reflector of the luminaire, you may clean it. Before cleaning, disconnect from the main supply and allow the system to cool down. Wipe the surface of the diffuser or reflector gently with a tissue containing ethanol.
- Do not open, disassemble, or manipulate the SPECTRA TUNE 7!

## WARNING & SAFETY

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- Installation of the luminaires and the equipment **MUST** be done only by qualified staff, taking the security measures collected by the regulation in force at the installation site.
- All necessary measures must be taken to avoid electric shock when handling electrical and/or electronic equipment. In case of doubt disconnect the main power supply when handling lighting equipment.
- The SPECTRA TUNE 7! is intended for use in dry interiors only. It is not water resistant and must be protected from adverse weather conditions (hot and humid).
- To avoid damage, do not expose it to spray, liquids, dust, or chemical products.
- To prevent injury, use this product in accordance with the International Standard “Photobiological Safety of Lamps & Lamp Systems” IEC 62471. This light engine falls under Risk Group RG1 – Low Risk Group in accordance with the standard IEC 62471:2006. Regardless of the risk factor classification, LEDMOTIVE does not recommend staring directly into any LED lamp or luminaire.
- During normal operation, the fixture can achieve high temperature, be careful when handling it to avoid burning.
- The SPECTRA TUNE 7! luminaire uses an active cooling system to dissipate the heat produced by the LEDs when they are on. Do not manipulate the luminaire when it is connected to the mains and prevent any contact with the moving parts (cooling fan).
- All statements regarding safety of operation, warranty and technical data only apply when the unit is operated correctly according to its specifications. The safety of any system incorporating the equipment is the responsibility of the assembler of the system.

## DISPOSAL

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- In accordance with EU Directive WEEE (Waste Electrical and Electronic Equipment), the SPECTRA TUNE 7! must not be disposed of with another household waste.
- At the end of their life, it must be taken to the appropriate local facility available for the disposal or recycling of electronic parts.



**LEDMOTIVE**

Turn on the future

## SPECTRA TUNE 7! Spectrally tunable downlight

### WARRANTY

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This product has passed the proper EU regulations and directives. LEDMOTIVE offers a one-year limited warranty.

### DISCLAIMER

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This document is intended for all audiences. The material herein is provided "AS-IS" and LEDMOTIVE makes no warranty of any kind regarding this material.

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