Design study
Light controller for experiments/studies on optimal lighting for fish larvae

The following examples show the options/potential of an illumination controller for experiments on the influence of lighting duration, light intensity and light spectrum on the ontogeny of fish larvae. This controller provides on the one hand ample opportunities to conduct various experiments and on the other hand is easy to use. In the examples below, you will see that it is possible both to have a daily light-dark cycle that stays the same as well as an infinitely variable/continuous change from one type of daily cycle to another one over any period of time. The setting of maximal brightness makes it possible to simulate different arrays of light intensities for the different light-dark cycles.

For the daily increase and decrease of light intensity, a sinus curve was chosen as this simulates the daily rise and fall of the sun the best. If desired, also linear changes of light intensity are possible to implement. Another option is a spectral change from one photoperiod to the next (not shown in the examples below). The controller has membrane keys and a LCD display. Internal resolution for light intensities: 1023 steps.

The following parameters can be set on the controller:

Adaptation Period (days, 0 - 100, resolution: 1 Day): defines the Number of days for morphing one daily cycle to another.

Photoperiod Duration Start (minutes, 0 - 1440 (0 - 24 h), resolution: 1 minute): defines the first light-dark cycle (at start of Adaptation Period).

Photoperiod Duration Target (minutes, 0 - 1440 (0 - 24 h), resolution: 1 minute): defines the light-dark cycle after Adaptation Period.

Output Intensity Start (percent, 0-100, resolution: 1%): defines maximum light output at start of Adaptation period.

Output Intensity Target (percent, 0 - 100, resolution: 1%): defines maximum light output after Adaptation Period.

The examples shown below illustrate the light output of the controller using various parameters. They are not ment to be proposals for experimental designs, they should merely show the possibilities the controller will give you.

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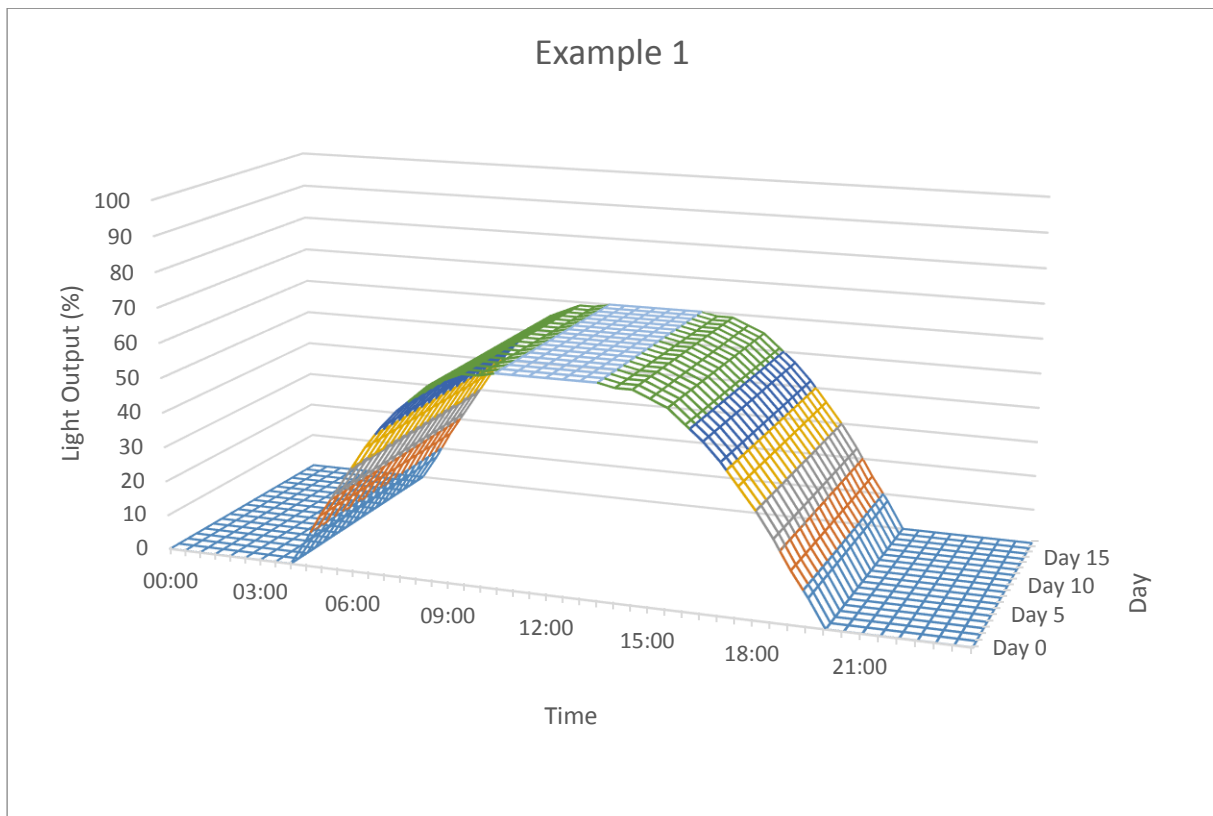
Example 1:

Settings at day 0:

Adaptation Period: 2 days [irrelevant]
Photoperiod Duration Start: 960 min (16:00) [irrelevant]
Photoperiod Duration Target: 960 min (16:00)
Output Intensity Start: 60 % [irrelevant]
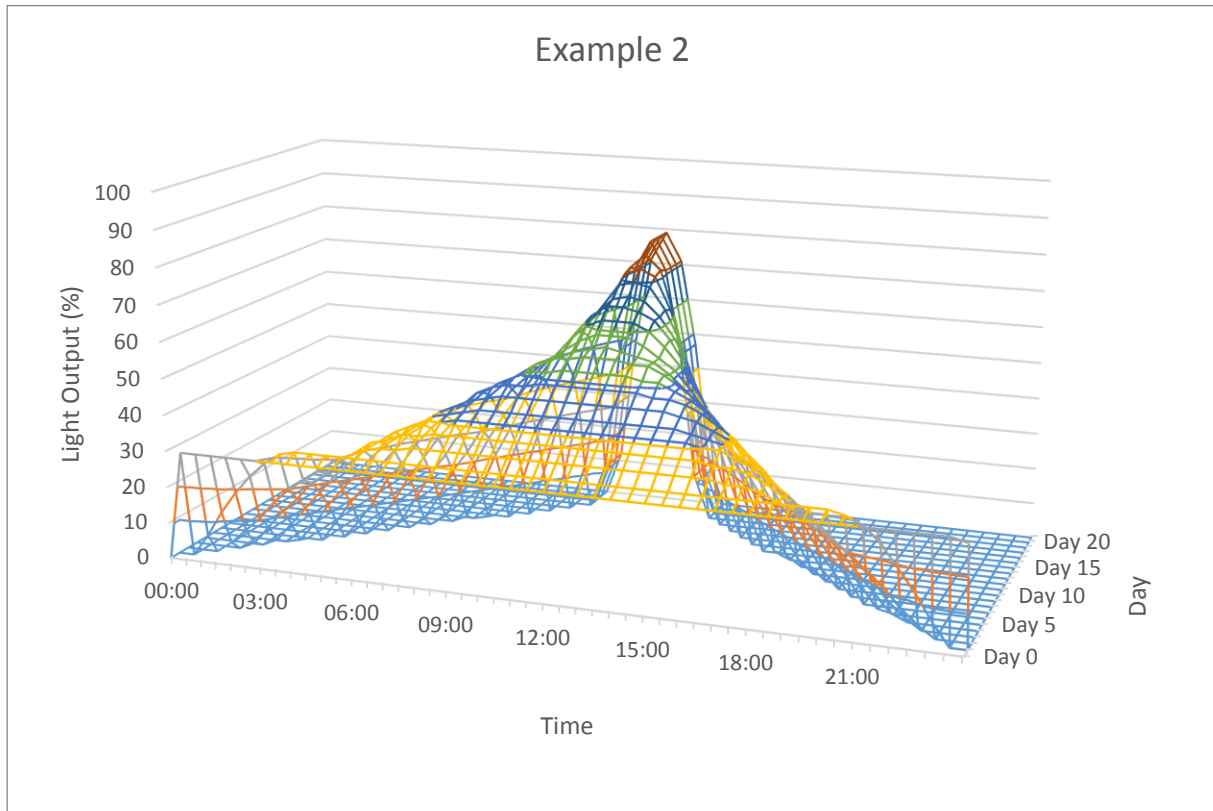Output Intensity Target: 60 %

Example 2:

Settings at day 0:

Adaptation Period: 18 days
Photoperiod Duration Start: 1440 min (24:00)
Photoperiod Duration Target: 200 min (03:20)
Output Intensity Start: 30 %
Output Intensity Target: 80 %

Example 3:

Settings at day 0:

Adaptation Period: 0 days
Photoperiod Duration Start: [irrelevant]
Photoperiod Duration Target: 1080min (18:00)
Output Intensity Start: [irrelevant]
Output Intensity Target: 100 %

Change settings at day 5:

Adaptation Period: 6 days
Photoperiod Duration Start: 1080 min (18:00)
Photoperiod Duration Target: 810 min (13:30)
Output Intensity Start: 100 %
Output Intensity Target: 70 %