

The Fundamentals of Light Intensity

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Properly lighting your aquarium can be perplexing if you do not understand light intensity. This parameter can be measured in two ways: at its source (in watts) and at the surface it impacts (in lux). Aquarium lights are sold according to specific wattage needs, but you need to understand how watts and intensity relate to your aquarium's lighting needs.

watts

Light intensity at the source is measured in watts. The higher the watts, the more intense the light, and the more energy required to produce the light. A 100-watt bulb, for example, will give off more light than a 40-watt bulb, and will cost more to use. Therefore, the wattage of a light fixture can give you a general idea of the brightness of the emitted light. However, measuring the lux output of a fixture is the only way to determine if your aquarium inhabitants are receiving the light they require to thrive.

lux

Light intensity measured at an impacted surface is expressed in lux. The intensity of the sun on the water surface above a reef can reach values exceeding 120,000 lux. However, varied weather patterns and air quality causes this measurement to average approximately 75,000 lux. As sunlight enters the water and the different wavelengths are absorbed, the light intensity diminishes.

Water clarity determines the speed at which light degrades in different aquatic environments. For example, the level of intensity on a reef with clear water will average about 20,000 lux at a depth of 15 ft, and 10,000 lux at 30 ft. Knowing where an organism lives in nature will give you a good idea of the light intensity required to maintain that organism in your aquarium.

Lux meters such as the [LUX Light Meter](#) can accurately measure from 0.000 to 50,000 lux with $\pm 6\%$ of reading ± 1 digit. Use a lux meter to check your lighting for required intensities, as well as to determine when bulbs in your lighting system need replacing.

Can watts be used to calculate lux?

A. There is no exact formula to determine the lux produced by a bulb of a specific wattage. One lux is equal to 1.46 milliwatts (0.00146 watts) of energy of one specific frequency (555 nm) hitting a surface area of one square meter. However, since bulbs used in aquarium lighting systems emit light of many frequencies it is impossible to pinpoint the lux based on wattage.