

EHEIM

Guide Light in the Aquarium

With the latest results from EHEIM research light lab

The most important tips



Freshwater and
Reef aquarium



Contents

Brief essentials

You should be familiar with these principles and rules 4

The physical properties of light

What you should know about light 6

Brief summary

Before deciding on your lighting 8

EHEIM concept of lighting

New findings from our light laboratory 10

EHEIM T5 fluorescent tubes 12

EHEIM powerLED lamps 14

EHEIM powerLED – ensures vivid colours 16

List of keywords 18

Do you need advice and help? 19

Imprint 19



EHEIM

Dear reader,

If you delight in the beauty of the underwater world and would like to observe the colourful bustle in your aquarium – you need light.

The underwater world itself needs light too. Life in the aquarium can only exist with light but light is a complex physical phenomenon. Unlike the countryside, where there are many factors which influence the way in which light radiates, the lighting in a small artificial biotope must be the very best possible.

On the subject of lighting for aquariums, there is a lot of information and a great many opinions – and amongst them an abundance of superficial knowledge and a plethora of half-truths.

With this little Guide we should like to shine some light in the “semi-darkness” and, for this purpose, we have briefly summarised the essentials for you.

We shall also present you with the latest findings from our light laboratory: Our own super-efficient lighting concept that puts everything else in the shade.

We wish you an illuminating experience and much pleasure from your aquarium.

Your EHEIM Aquarium Team

You should be familiar with these principles and rules

Light is a critical factor in the ecology of every aquarium. That is as true of freshwater aquariums as it is of marine water aquariums but it is not so much the animals that need the light as the plants and (in marine water) the corals.

Why do I need light in my aquarium?

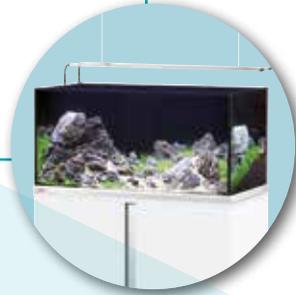
In a freshwater aquarium it is light which gives plants the energy for photosynthesis and growth. Plants will decontaminate the water, extract their basic nutrition from algae and provide the oxygen for fish and the other inhabitants in the aquarium, to breathe.

Obviously, no “plants” in the everyday sense, will grow in a marine water aquarium where light influences the growth and colouration of corals. Light feeds the plankton and symbiotic algae (zooxanthellae) which live in the tissue of corals and nourishes them.

What about daylight?

Your aquarium should receive the minimum possible amount of natural daylight (which alone is not sufficient for the purpose) and combined with the artificial lighting in an aquarium, the amounts may change. Often the presence of indirect light will be responsible for considerable growth in algae.

In no circumstances should an aquarium ever be exposed to direct sunlight – if it is, the temperature of the water may increase to an excessive extent.



How much light will the animals need?

Most of an aquarium's inhabitants only need a little light. For many of them it will be enough to find their way around, find their food and reproduce but the lighting needs of different animals and individual species of fish are quite different: some even need light to grow.

How much light is needed?

- As in the natural world, the rhythm of day and night must be maintained in the aquarium. That means that there should be about 8 – 10 hours of light a day – ideally always at the same time of day (timer).

Plants need a period of at least six hours of brightness if they are to make adequate use of the light.

- If you would like to have your aquarium lit at night, simply switch the light on later in the morning or programme a break in the middle of the day (2 – 4 hours.) Interrupting the light in this way will also inhibit the growth of algae.

Caution: A break in the middle of the day should only be used in the case of a fresh water aquarium. In the case of a marine water aquarium it would be harmful.

- To avoid any sudden changes in the level of light, you should simulate a slow sunrise and sunset, gradually switching the lights on or off (where there are number of light sources).
- If you want to make a fundamental change to the periods of lighting, you should do it in stages (of about 30 minutes each) so the animals and plants can get used to the new timing and adjust their bio-rhythms gradually.



What you should know about light

For a long time we did not know what light actually was. In the middle ages it was even believed by some that the eyes emitted rays and that sight was the effect of those rays touching the world around. The questions associated with light seem only to have been solved in the last 100 years, though this gave rise to quantum physics and quantum electrodynamics – which only threw up new questions.

What actually is light?

For the physicist, light is a form of electromagnetic radiation – but only the small range (between 380 and 750 nm), which is visible to humans. There are also gamma rays, X-rays, ultra-violet, infrared, microwaves and radio waves. The forms of radiation which border on the visible range, such as infrared and ultraviolet, are also often referred to as “light”.

What is the colour spectrum?

Light occurs in different wavelengths which we perceive – through a prism, for example, or a raincloud – as colours (rainbow colours). White only looks like a colour to us (e.g. sunlight) when colours of the spectrum are combined. In the case of artificial sources of light, it is possible to influence the colour spectrum; individual colours can be emphasised.

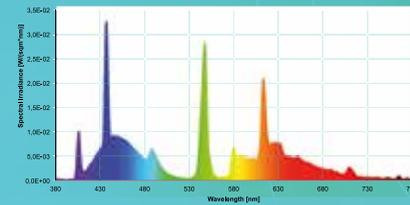
What's the effect of the light colours?

Blue and red are the wavelengths that can absorb chlorophyll most effectively and, for that reason, these colours are the most beneficial for photosynthesis. Green is least useful and is therefore reflected or allowed to pass through. That's why leaves look green. If the red element in light is predominant plants will grow to an enormous size, but they will be delicate. If the light is predominantly blue, on the other hand, their growth will be extremely slow and they will be compact. Optimum plant growth therefore occurs if there is a balance between the blue and red spectrum.

What does full spectrum mean?

Sunlight, or daylight, has the full colour spectrum and can be effectively simulated using what are known as full-spectrum fluorescent tubes. This requires at least

Colour spectrum T5 EHEIM freshwater plants



four different fluorescent substances or 5-band fluorescent tubes. Such tubes, however, possess a considerable smaller radiant power than 3-band fluorescent tubes. It is a cliché to say “3-band is better for plants but full-spectrum is better for the eye”.

It is different with high-quality LED lamps (such as EHEIM powerLEDs for freshwater aquariums) as they satisfy both conditions. They reproduce the full sunlight spectrum and have a high radiant power. They are therefore both “good for the eye” and outstanding for plants.

How is light measured?

The units of measurement for light refer to brightness, luminous efficiency, light colour and colour reproduction.

• LUX (lx)

LUX (lx) refers to luminous intensity (the amount of light which falls on a surface), e.g.: midday sun in a tropical summer 80.000 – 100.000 lx; dull summer's day 10.000 – 20.000 lx; full moon at night about 25 lx; bright window 4.000 – 2.000 lx

• Lumen (lm)

Lumen (lm) refers to the luminous efficiency that a lamp radiates in every direction. From an indication of luminous efficiency (lm) and wattage (W) it is possible to identify efficiency, e.g.: (incandescent) light bulb 10–20 lm/W; energy-saving bulb 50 – 85 lm/W; T5 fluorescent tube 80 – 90 lm/W; LED depending on design 20 – 120 lm/W.

• Kelvin (K)

Kelvin (K) indicates the colour temperature – i.e. the light colour. Lower figures represent the warm, reddish range, and higher figures the cold, bluish range.

The light colours of lamps are classified in three groups: warm white 2.000 – 3.000 K (pleasant moods); neutral white approx. 4.000 K (objective moods); daylight white from 5.000 (natural). In the case of fluorescent tubes approx. 5.300 K of daylight white.

In the case of freshwater aquariums, the significant figures lie somewhere between 4.000 and 7.000 K. In the case of marine water aquariums, the figures should be above 10.000 K.

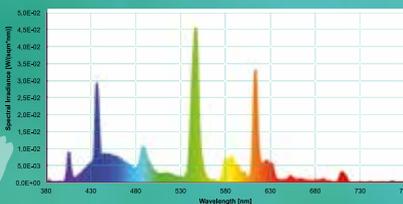
• Colour reproduction index (Ra)/CRI

Another unit of measurement is the colour reproduction index (Ra)/CRI, which indicates the effect, regarding colour, that a lamp generates on coloured objects or people. The higher the figure the more natural the impression (e.g. in an aquarium).

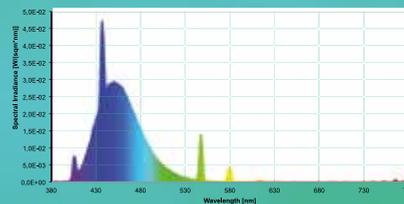
• Band fluorescent tubes

We also refer to 3 band or 5 band fluorescent tubes if they have 3 or 5 particularly strong characteristics in their colour spectrum (see also full spectrum).

Colour spectrum T5 EHEIM freshwater daylight



T5 EHEIM marinepower actinic blue



Before deciding on your lighting



Changing to LEDs

If you change your lighting to LEDs, it is particularly advisable in a marine environment that sensitive corals should be allowed to accustom themselves slowly and gradually to the greater intensity of LED lighting. Sensitive corals should, therefore, be moved to a lower position for a period of 3 - 4 weeks and the daily period of lighting reduced to 5 - 6 hours. This will help prevent your corals from fading.



Good lighting is among the most important items of basic equipment in an aquarium. In the case of aquarium combinations and complete sets, one or more fluorescent tubes will usually be integrated in the cover or hood. In the case of open aquariums there are suspended, clamped and mounted lamps of various types.

What does aquarium lighting have to do?

Good aquarium lighting will offer light adjusted to maximum effect. Particularly important are colour coordination, luminous efficacy and efficiency. In **freshwater aquariums** plants need a balance of blue and red spectrum for healthy growth. In a **marinewater aquarium**, on the other hand, the blue element will predominate (from 10000 Kelvin). The light must also be stronger in this case, so that it can penetrate into the tissue of the corals.

What should I look out for in particular?

There are many suppliers of lighting for aquariums and just as much different information about levels of performance. There is also a lot of superficial knowledge in circulation and you should, therefore, be sceptical when wonderful properties are mentioned or colourful diagrams seem to promise fantastic levels of performance.

The following are of particular importance:

- Luminous efficacy and/or energy efficiency (lumen per Watt – lm/W)
- Colour temperature and/or light colour (Kelvin – K)
- The balance of the colour spectrum (for plants or corals)
- Light penetration (also, if appropriate, for aquariums measuring over 50 centimetres in height)
- Natural, genuine colour reproduction (in the case of daylight lamps)
- Lifespan (average lifespan according to DIN at 3 cycles of operation a day)



Which types and technologies are available?

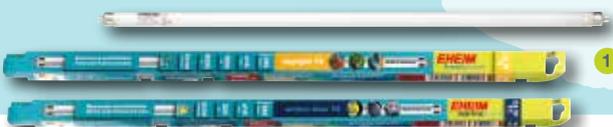
• **Fluorescent tubes** are the most popular form of lighting for aquariums. The conventional T8 tubes (diameter 26 mm) are still available, but the modern T5 tubes (diameter 16 mm) are much more efficient and technically superior – in particular those manufactured by EHEIM. They are available for freshwater and marinewater aquariums. Fluorescent tubes should always be used with suitable reflectors to amplify the light downwards.

• **LED** – a method of lighting that is gaining ground all the time. EHEIM's new and flexible EHEIM powerLED lamps, for example, are capable of outstanding levels of performance that are in no way inferior to the performance that fluorescent tubes are capable of, and in many areas even improve upon them.

The EHEIM powerLED lamp is ideal for small aquariums (e.g. nano-tanks) as an extra spotlight.

• **HQI lamps** are high-pressure mercury vapour lamps with metal halide which are mostly used in marine water aquariums. They are usually suspended above the aquarium, require add-on equipment and are still seldom found in home aquariums because of their high level of power consumption ("wattage").

• **HQL lamps** are high-pressure mercury vapour lamps containing fluorescent substances. They need a ballast, offer no more than a limited colour spectrum and are rarely used nowadays owing to their relatively low level of efficiency.



- 1 – EHEIM freshpower daylight, 24 W, T5
EHEIM marinepower actinic blue, 24 W, T5
- 2 – EHEIM powerLED daylight
- 3 – EHEIM powerLED daylight & actinic blue
EHEIM powerLED actinic blue
- 4 – EHEIM proxima 250 plus with
EHEIM powerLED (freshwater)



New findings from our light laboratory

We actually only wanted to test the multitude of products on offer in the market, but none really convinced us. We therefore sought out and researched new concepts – with surprising results. We can now offer you our own innovative range of lighting – with outstanding levels of efficiency not previously achieved.

T5 Fluorescent tubes with new specialised fluorescent substances

Some years ago, when the more modern T5 technology was being introduced, the conventional pattern of T8 tubes (light colour etc.) was simply copied and, until now, many T5 fluorescent tubes have not been able to develop their potential. We have changed that.

EHEIM
freshpower

EHEIM
marinepower



- 1 – EHEIM freshpower daylight, 24 Watt, T5
- 2 – EHEIM marinepower hybrid, 24 Watt, T5

With new specialised fluorescent substances we have successfully achieved considerably better results:

- Optimised luminous fluxes for maximum efficiency
- Optimum luminous efficacy (lumens per watt) – up to 60 % light efficiency compared to T8 tubes
- Standard HO (High Output)
- Clear light, a high level of bright light penetrating as far as the substrate (even to depths in excess of 50 centimetres)
- Ideally balanced spectrum, combined light colours (for plants and/or corals)
- Natural, genuine colour reproduction
- Very long lifespan of about 20.000 hours (at 10 hours a day for over > 4 years)
- 4 colours, 2 each for both freshwater and marine water aquariums (may be combined)



EHEIM
powerLED



EHEIM powerLED for fresh- and marinewater

Flexible LED strips with exceptional levels of performance

Applying the experience gained from our own “powerLED” lamp for smaller aquariums (e.g. nano tanks), we have developed LED light bars, which are not in any way inferior to fluorescent tubes. On the contrary: EHEIM powerLED lamps even offer the following additional advantages:

- 30 % increase in energy efficiency (1 watt generates 120 lumens; but T5 fluorescent tubes, on the other hand, only generate about 85 lumens)
- One 24 W LED lamp will replace, for example, one 39 W T5 fluorescent tube (including reflector)
- Optimum illumination as far as the substrate – even in aquariums over 50 centimetres in height
- Ideally balanced spectrums and combined light colours for plants and/or corals
- Full spectrum of sunlight with outstanding performance in ranges important for photosynthesis (freshwater)
- Natural, genuine colour reproduction (CRI > 90 freshwater)
- Even longer lifespan – more than 50.000 hours Std. (at 10 hours a day for over > 10 years)
- 4 colours – two each for both freshwater and marine water aquariums equivalent to colours of fluorescent tubes

Additional advantage: flexibility

- There are 8 different lengths for aquariums, with a width of 37 – 154 cm (adjustable using an extending support frame of stainless steel)
- Using the T5 or T8 adapter, it is possible to replace almost any similar fluorescent tube
- The high-quality, solid aluminium casing (anodised) is resistant to marine water – for the purposes of DIN 8149-1
- A pre-drilled thread in the top of the casing can be used for screwing in bolts or hooks at the desired point (e.g. for attachment to a cover or cable suspension)
- Intelligent power supplies only provide the power which is actually required (12 V), thus saving energy
- A number of lamps can be connected to a single power supply using connectors

- 1 – EHEIM powerLED hybrid
- 2 – Adapter LED
- 3 – Double connector
- 4 – Power supply 20 W



EHEIM T5 fluorescent tubes



For freshwater aquariums:

EHEIM freshpower daylight

- daylight tube (close to the sunlight spectrum)
- natural colour reproduction of animal and plant underwater worlds
- blue-red balance for good plant-growth
- maximum energy efficiency and brightness
- for particularly demanding plants, combine with EHEIM freshpower plants fluorescent tube

EHEIM freshpower plants

- optimised blue and red spectrum
- for good growth in demanding plants
- clear, bright light (without warm tones and yellowing)
- maximum lumen wattage
- enhances natural blue and red colours of fish
- can also be used as a sole source of light on the basis of the lumen wattage (or more than one tube if required)
- can be combined with EHEIM freshpower daylight fluorescent tube

For marinewater aquariums:

EHEIM marinepower hybrid

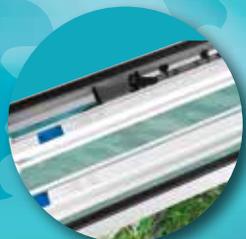
- optimum mix of both daylight and deep blue tubes
- high level of luminous efficiency and coordinated spectrum
- extremely well-suited to reef aquariums with corals and invertebrates
- good colour reproduction and fluorescence
- no additional actinic lighting needed
- can be combined with EHEIM marinepower actinic blue fluorescent tube

EHEIM marinepower actinic blue

- promotes absorption of chlorophyll using a specific spectrum (400 – 480 nm)
- amplifies natural fluorescence of corals and invertebrates
- can be combined with EHEIM marinepower hybrid fluorescent tubes

Overview of EHEIM T5 fluorescent tubes:

Type of tube	T5 Ø 16 mm				
Length	Length mm	549	849	1149	1449
Rated output	Watt (W)	24	39	54	80
Colour temperature					
daylight	Kelvin (K)	6.500			
plants	Kelvin (K)	4.000			
hybrid	Kelvin (K)	17.000			
actinic blue	Kelvin (K)	> 25.000			
Rated luminous flux					
daylight	Lumen (lm)	1.805	3.300	4.750	6.500
plants	Lumen (lm)	1.200	2.050	3.050	4.100
hybrid	Lumen (lm)	1.100	1.950	2.800	3.900
actinic blue	Lumen (lm)	525	850	1150	1.550
Average lifespan	Hours (h)	20.000			



- Freshwater**
- 1 – EHEIM freshpower daylight
 - 2 – EHEIM freshpower plants
- Marinewater**
- 3 – EHEIM marinepower hybrid
 - 4 – EHEIM marinepower actinic blue



Changing tubes:

When changing tubes, it is recommended that you do not change them all at the same time, but at intervals of at least two weeks. In that way your plants, corals and animals will not have to adjust themselves to a sudden change in light (enhanced lighting).

EHEIM powerLED lamps



Marine

Attention!

Operating requirements:

- Power supply with 20 watt for powerLED 11 to 20 Watt
- Power supply with 100 Watt for powerLED 34 to 43 Watt

For freshwater aquariums:

EHEIM powerLED fresh daylight

- bright daylight (7.000 K) with full sunlight spectrum (full spectrum)
- natural colour reproduction of animal and plant underwater worlds
- balanced blue-red spectrum for good plant-growth
- maximum energy efficiency (120 lm/W) and brightness
- for particularly demanding plants, can also be combined with EHEIM powerLED fresh plants

EHEIM powerLED fresh plants

- bright sunlight (10.000 K) with optimised spectrum (blue 465 nm and red 625 nm) for healthy growth of demanding plants
- optimum for Malawi and Tanganyika aquariums
- enhances blue and red colours of fish and plants in a natural way
- maximum energy efficiency (100 lm/W) and high level of brightness
- on basis of lumen wattage, can be used as the sole source of light or in combination with EHEIM powerLED fresh daylight

For marinewater aquariums:

EHEIM powerLED marine hybrid

- optimum mix of white and actinic light
- high level of luminous efficiency and co-ordinated spectrum in a range important for photosynthesis (400 – 500 nm) to promote colour and growth of corals
- extremely well-suited to reef aquariums with corals and invertebrates
- good colour reproduction and fluorescence
- can be used as the sole source of light with no need for additional actinic lighting
- can be combined with EHEIM powerLED marine actinic blue

EHEIM powerLED marine actinic blue

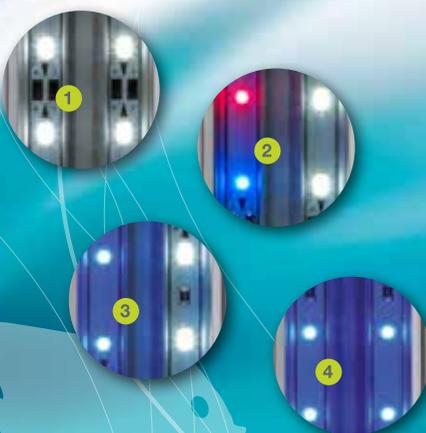
- pure actinic light
- promotes the absorption of chlorophyll by using a specific spectrum (400 – 500 nm)
- amplifies natural fluorescence of corals and invertebrates
- can be combined with EHEIM powerLED marine hybrid

Overview of EHEIM powerLED lamps:

Light bars	Length (mm)	360	487	664	771	969	1.074	1.266	1.374
For aquariums between	mm	372 to 527	524 to 679	680 to 831	784 to 938	985 to 1136	1094 to 1241	1290 to 1433	1400 to 1534
	Rated output	Watt (W)	11	16	20	24	30	34	40
Colour temperature									
daylight	Kelvin (K)	7.000							
plants	Kelvin (K)	10.000							
hybrid	Kelvin (K)	17.000							
actinic blue	Kelvin (K)	> 25.000							
Rated luminous flux									
daylight	Lumen (lm)	1.320	1.920	2.400	2.880	3.600	4.080	4.800	5.160
plants	Lumen (lm)	1.100	1.600	2.000	2.400	3.000	3.400	4.000	4.300
hybrid	Lumen (lm)	787	1.152	1.440	1.728	2.160	2.448	2.880	3.096
actinic blue	Lumen (lm)	253	368	460	552	690	782	920	989
Average lifespan	Hours (h)	> 50.000							

Choice and location of tubes – type of LED (light colour)

If plant tubes are used, it is recommended that they be located above the plants or, in combination with daylight, to the rear.



Freshwater

- 1 – EHEIM powerLED daylight
- 2 – EHEIM powerLED plants

Marinewater

- 3 – EHEIM powerLED hybrid
- 4 – EHEIM powerLED actinic blue



EHEIM powerLED – ensures vivid colours

EHEIM
powerLED

The attractively shaped round lamp with high quality, low energy use Power-LED (up to 80% energy saving) distributes light evenly throughout the tank and ensures a beautiful underwater world, due to a light spectrum and light intensity precisely designed for marine creatures and their growth requirements.

- High quality LED (81 interconnected diodes) for higher proportion of blue light right to the bottom of the tank
- High energy efficiency, only 7 Watt
- Long service life approx. 20.000 service hours
- With practical clamps for variable fixing
- Up to 20 mm (3/4") clamping width, also for open aquariums with frame moulding
- 12 volt mains adapter

EHEIM lighting is available for the following applications:

For freshwater:
EHEIM powerLED daylight

For marinewater:
EHEIM powerLED daylight & actinic blue
EHEIM powerLED actinic blue



EHEIM powerLED for freshwater aquariums

EHEIM powerLED not only covers the majority of the light spectrum, but also, compared to similar available neon light tubes, offers excellent performance in the range between 400 and 500 nm, which is important for photosynthesis.

daylight: high light quality



EHEIM powerLED for marine water aquariums

Promotes colour rendition and the growth of corals. The corals appear with the most vivid colours due to the stimulation of their inherent fluorescence. The EHEIM powerLED also gives excellent performance versus comparable commercially available fluorescent lamps in the range of 400 to 500 nm.

daylight & actinic blue:
high intensive full spectrum



actinic blue: additional blue lighting



1 – EHEIM powerLED actinic blue
2 – EHEIM powerLED daylight & actinic blue

3 – EHEIM powerLED with clamp
4 – EHEIM powerLED attached to the EHEIM aquacorner

EHEIM aquastyle with EHEIM powerLED

List of keywords

	Seiten
actinic	13, 15
adapter	9, 11
algae	4, 5
attachment.....	11, 16
3/5 band fluorescent tubes.....	7
biorhythm.....	5
brightness.....	7, 10/12/14
chlorophyll	6, 13, 15
clamp lamp	8, 9, 11, 16
corals.....	4, 8, 9, 10/11/ 13/15/17
colours of the spectrum.....	6, 14
colour reproduction	7, 9, 10/11/12/ 13/14/15
colour spectrum.....	6, 7, 9
colour temperature	7, 9, 13, 15
cover.....	8, 11
CRI.....	7, 11
daylight	4, 6, 7, 12/13/14
day-night rhythm	5
diodes.....	16
efficiency/ energy consumption	7, 8, 9, 10/11/12/14/16
fluorescence	13, 15, 17
fluorescent substances.....	7, 10
fluorescent tubes	6, 7, 8, 9, 10/11/12/13
freshwater	4, 5, 7, 8, 9, 10/11/12/14/17
full spectrum.....	6, 7, 11, 14, 17
gamma rays	6
high output HO	10
HQI lamps.....	9
HQL lamps.....	9
hybrid.....	10-14
illumination.....	11, 16
infrared	6
invertebrates.....	13, 15

	Seiten
Kelvin.....	7, 8, 9, 13/15
LED lamps	7, 8, 9, 11/12/ 14/15/16/17
lifespan	8, 9, 10/11/ 13/15
light bars.....	11, 15
light colours.....	6, 7, 9, 10/11
light penetration.....	9, 10
light spectrum.....	6, 7, 8, 9-17
lumen (lm).....	7, 9-15
luminous efficacy.....	8, 9, 10
luminous flux, rated	13, 15
lux (lx)	7
marine water.....	4/5, 7, 8, 9, 10/11/13/15/17
microwaves.....	6
midday break.....	5
moonlight.....	13, 15
nano aquarium.....	9, 11
period of illumination	5
plants.....	4/5, 6, 7/8/9/ 10/11/12/14/16
photosynthesis	4, 6, 11, 15, 17
plankton.....	4
power supply	11, 15, 16
radio waves	6
rated output	13, 15
reef aquarium.....	13, 15
reflector.....	9, 11
replacement.....	9
sunlight	4, 6, 7, 11/12/14/17
suspension.....	11
T5/T8 tubes	9, 10, 12, 13
UV ultraviolet	6
wavelengths.....	6
X-rays	6
zooanthellae.....	4

Do you need advice and help?

If you have questions, go and see your specialist aquatics retailer. Fishkeepers' clubs are also useful.

You can find a specialist aquatic retailer by visiting our website

www.eheim.de

You will also find there a lot more information about aquariums, technology, fish, plants etc.

Imprint

EHEIM GmbH & Co. KG

Plochingen Str. 54
73779 Deizisau

Phone +49 (0)7153 / 70 02 -01

Fax +49 (0)7153 / 70 02 -174

E-mail: info@eheim.de

Registered in Stuttgart HRA 211766

VAT ID: DE 1453 394 92

Managing Director:

Ibrahim Mefire Kouotou

Text:

Kaspar H. Noeren CMC

Design:

Bettina Müller.DESIGN

Quality has a good name.

EHEIM

Light is life. In this Guide to "Light in the aquarium" EHEIM briefly summarises the essential criteria for lighting in an aquarium. An overview is provided of the fundamental rules of lighting, the physical and biological contexts and different types and methods of lighting. Here too, EHEIM presents its own innovative concept of lighting and their range of super-efficient T5 fluorescent tubes and LED lamps.

EHEIM 7994220-GB/05.14



Your specialist aquarium dealer:



EHEIM GmbH & Co. KG
Plochinger Str. 54
73779 Deizisau, Germany
Phone +49 (0)7153 / 70 02 -01
Fax +49 (0)7153 / 70 02 -174

www.eheim.de