

TRUE-LIGHT[®]

Full spectrum daylight fluorescent lamps

- Healthy light
- Concentrated working
- Superb colour recognition
- Increased activity
- Improved vision
- Well-being
- A good mood



5,500 Kelvin

TRUE-LIGHT®

Full spectrum daylight fluorescent lamps

Light is Life

– Light has a fundamental influence on our life

Natural light is essential for life on Earth. Its effects have a decisive influence on the development and well-being of all living creatures, as

well as on the course of nature. Light rays control biological processes in organisms. Light impacts positively on humans, animals, and plants,

strengthening health and psyche. Natural daylight makes us feel good.

We spend a lot of time, however, in places that are artificially lit, both at work and in our leisure time. This lack of natural daylight on account of incorrect or insufficient light sources can lead to unpleasant side effects such as stress, flagging concentration, fatigue, feeling unwell, headaches, and even depression.

The wrong lighting can result in disorders of the vegetative nervous system.



Good light

– is not a question of lux and lumen alone

Natural daylight created by the sun consists of a wide, continuous radiation spectrum.

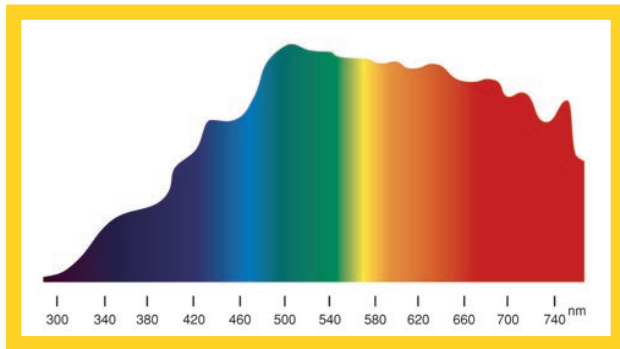
In the visible field from 380 to 780 nm it contains the colours violet, blue, green, yellow, orange and red, as well as radiation in the non-visible margins, ultraviolet (280 – 380 nm) and infrared (> 780 nm) being characteristic elements. In moderate, harmless doses, the UV proportion of natural daylight is of crucial importance for our health, one the one hand on account of

its physical properties, which help improve our vision, and on the other because of the medical and biological effects on the human body and psyche.

For this reason, active artificial lighting for humans, animals and plants must be similar to daylight.

As such, high-quality light is defined not only by creating sufficient brightness, but primarily by distribution across the entire radiation spectrum, similar to daylight.





The spectral composition of natural daylight

True-Light®

– the full spectrum daylight fluorescent lamps

TRUE-LIGHT® lamps are fluorescent lamps that emit, almost identically, the entire range of natural daylight. They were developed in the USA in order to simulate natural daylight indoors. They were first used in space travel and US Navy submarines.

TRUE-LIGHT® is the original full spectrum fluorescent lamp. Intensive research in physics, photophysiology and photopsychology, not to mention on-going product development, have made TRUE-LIGHT® lamps a unique source of light.

Salient features of TRUE-LIGHT® lamps:

- A spectrum almost identical to natural daylight
- Stimulating biological effect
- Superb contrast vision
- Absolutely true-to-life colour rendering through colour temperature in optimum daylight range 5,500 K
- Optimum colour rendering properties Ra96
- Wider, more continuous spectrum compared with other fluorescent lamps
- Steady, balanced light quality
- Service life* – when operated with electronic ballast (Warm start): 13,000 hours

* is the time it takes for a lighting system's luminous flux to reach 80% of the 100h value.

** is the average electric lifetime (survival rate) of a number of lamps operated under standardized conditions (50% failure rate)

- Medium life** – when operated with electronic ballast (Warm start): 24,000 hours
- Luminous efficacy up to 71lm/W

Easy and straightforward to use:

TRUE-LIGHT® full spectrum fluorescent lamps fit standard lights and sockets. To increase their lifetime, reduce energy consumption, and effectively avoid distracting flickering, it is recommended to use a warm start electronic ballast.

The range of products consists of:

T8 lamps (26 mm diameter)

15W, 18W, 30W, 36W, 36W-1m, 38W and 58W

T5 lamps (16 mm diameter)

HE (high-efficiency) – 14W, 21W, 28W and 35W

HO (high output) – 24W, 39W, 54W, 49W and 80W

TC-L compact fluorescent lamps

Double tube diameter 17.5mm / Total width 37.0 mm

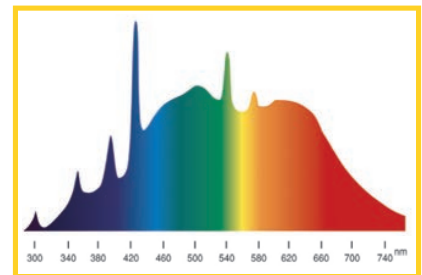
18W, 24W, 36W, 40W, 55W and 80W

ESL E27 compact fluorescent lamps

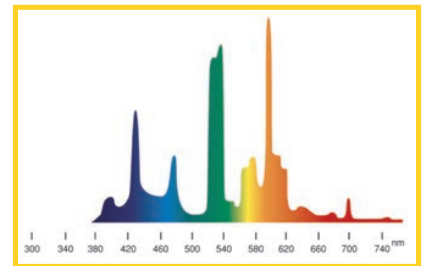
15W, 20W, 23W

CFL compact fluorescent lamp

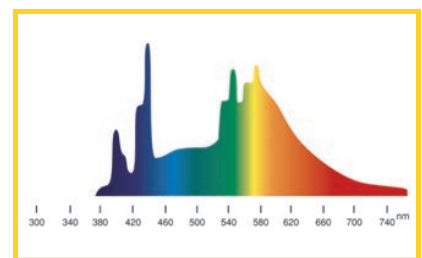
10W, 13W, 18W, 26W



TRUE-LIGHT®



Triphosphor colour neutral white



Standard colour universal white

TRUE-LIGHT®

Full spectrum daylight fluorescent lamps

Higher quality of work

– better light promotes well-being and productivity

In offices and at PC workstations, which already make higher demands on one's eyes, nerves, and concentration, it is important not to be exposed to any additional stress as a result of incorrect or bad lighting.

The following facts are of importance regarding the decision to use TRUE-LIGHT® full spectrum fluorescent lamps:

- A very spectral composition similar to daylight, which has an invigorating effect on people
- Very good contrast vision
- Increased concentration and output
- Fatigue-free vision
- Lower error rates and increased productivity on the part of employees
- Lower absence rates due to illness
- Greater efficiency

To a greater or lesser extent, lots of materials and objects such as paper and textile fibres, colour pigments and metals contain fluorescent particles.

The eye, however, can only perceive details and contrast accurately if the light hitting them also has the UV radiation contained in natural daylight.

Being close to daylight, the spectral composition of TRUE-LIGHT® full spectrum fluorescent lamps enables the exact colour rendering of artificially lit objects.



This means that deviations in the impression a colour makes and the selection of unintended hues can be avoided.

For this reason, printing works, artists, dentists, and dental laboratories all set great store by our products.





Where health is concerned

– natural daylight is an essential source

Relevant scientific studies have confirmed that a lack of natural daylight can have serious repercussions where health is concerned:

Insomnia
Headaches
Malaise
Depression

With their characteristic radiation spectrum, which, similar to natural daylight, has low levels of UV-A and UV-B, TRUE-LIGHT® lamps invigorate our metabolism and glands. They also have a positive effect on the vegetative nervous system. For years now TRUE-LIGHT® lamps have been used successfully in light therapy all over the world.

Nowadays, a lack of vitamin D is regarded as one of the main causes of rickets in children, osteoporosis, and muscle weakness.

A chronic lack of vitamin D can result in high blood pressure, sclerosis, various forms of cancer, and type 1 diabetes.

With regard to the afore-mentioned symptoms, artificial UV-irradiation in the range of effects of vitamin D3 photosynthesis produced evidence of therapeutic success in numerous robust studies.

A study conducted by Dr. Mehmet Yeni from the University of Technology in Berlin using the TRUE-LIGHT® 36W-T8 lamp revealed that “on account of the UV-A and UV-B radiation from the TRUE-LIGHT® lamps, a level of vitamin D3 irradiation was generated that is generally considered to be beneficial to health”.

Standard fluorescent lamps do not offer this composition. This results in additional strain on the eyes and can lead to flagging concentration and premature tiredness.

Standard triphosphor lamps can cause headaches as the brain constantly tries to make up for the missing colours in the spectrum through interpolation. This permanent processing causes stress and causes the eyes to tire more quickly (red eyes).

This physical discomfort impacts negatively on productivity.

There are lots of arguments in favour of TRUE-LIGHT®

– Studies and user reports

Given their special features, several studies of the effect of TRUE-LIGHT® lamps have been conducted. For the special fields in which full spectrum fluorescent lamps are used they provide a source of light that is particularly close to natural daylight. A selection of the numerous statements and published articles from studies and user reports confirm the advantages they offer:

“When we talk of health, balance, and physiological regulation, we are referring to the areas of the human body that are primarily responsible for maintaining good health: the nervous system and the endocrine system. These important control centres in the body are directly stimulated and regulated by light, and indeed to a far greater extent than science was prepared to acknowledge only a short time ago.”

Jakob Liberman, ophthalmologist: *Die heilende Kraft des Lichts – der Einfluss des Lichts auf Psyche und Körper* (The healing power of light – the influence of light on the mind and body), Piper-Verlag, Munich, 1996

“Numerous medical studies have now revealed that for a number of bodily functions the human organism is also dependent on a minimum degree of irradiation with UV light.”

K. Stanjek: *Zwielicht – Die Ökologie der künstlichen Helligkeit* (Twilight – the ecology of artificial brightness), Raben Verlag, Munich, 1989

“We have finally come to realize that light is a nutrient, like food, and that like the wrong diet, the wrong light can make us ill, while the right light can keep us in good health. Research has made a giant step forward, but there is still a lot to be done.”

Dr. John Ott, photobiologist: *Risk Factor Artificial Light – Stress due to incorrect illumination*, Knaur-Verlag, Munich 1989

“Light stress is the sum total of multiple dysregulations of the nervous system, such as irritability, and depending on temperament, aggression or melancholy, exhaustion, and reluctance to work. The US space agency NASA drew its own conclusions from this.

In the late 1960s it had the full spectrum lamp developed, whose spectrum, compared with standard fluorescent lamps, was improved with regard to several important points: the light colour corresponds to sunlight and the radiation is distributed far more evenly across the spectrum. The astronauts coped with it far better, and everyday users also report improved alertness and better moods.”

Dr. Johannes Holler, internist: *Das neue Gehirn* (The new brain), Junfermann'sche Verlagsbuchhandlung, Paderborn, 1996



“Artificial lighting has an influence on the depressive behaviour of students during the winter months (fluctuations in mood, lack of energy, increased appetite, irritability and increasing anxiety are indicators of what is called Seasonal Affective Disorder [SAD], or winter depression), as it influences their motivation to learn. Students exposed to lighting with full spectrum lights showed a significant decrease in depression and depressive symptoms compared with students exposed to cool white fluorescent lamps.”

W. Tithof: The Effects Of Full Spectrum Light On Student Depression As A Factor In Student Learning Dissertation, Walden University, 1998

“Positive experience with full spectrum light has now led not only to all US Polaris submarines being fitted with it, but to it also being used as standard lighting in hospitals, sanatoriums, schools, universities, as well at workstations and in private premises.”

Elke Brandmayr, Bodo Köhler, naturopathic doctor: Licht schenkt Leben (Light gives life), Fit fürs Leben-Verlag, Ritterhude, 1997

“With full spectrum lighting there was a significant decrease in the absence rate in an American elementary school”.

W. London: The Lancet, 1987, p. 1205

“We have recently come to realize that we permanently breathe in polluted air, eat contaminated food, and drink impure water. For the most part, though, we overlooked the most obvious nutrient of all, light.”

Jakob Liberman, ophthalmologist: Die heilende Kraft des Lichts – der Einfluß des Lichts auf Psyche und Körper (The healing power of light – the influence of light on psyche and body), Piper-Verlag, Munich, 1996

“With full spectrum lighting, students at an American university were more attentive and tired more slowly when conducting perception-related assignments.”

Maas, Jayson, Kleiber: Effects of Spectral Differences in Illumination on Fatigue, Journal of Applied Psychology 59, 1974

“In companies and schools with UV-enriched light, the number of people suffering from colds fell by over 40%.”

Rikard Küller, Prof. f. Umweltpsychologie: Non-visual Effects Of Daylight Daylight Symposium, CIE, Berlin, 1980

“Among children working in rooms with full spectrum lighting the frequency of tooth decay was a third lower than among children working in rooms with normal fluorescent light.”

Sharon, Feller, Burney: The Effects of Lights of Different Spectra on Caries Incidence, Archives Of Oral Biology 16, no. 12, 1971, p. 1427

and
Dr. John Ott, photobiologist: Risk Factor Artificial Light – Stress due to incorrect illumination Knauer-Verlag, Munich, 1989



TRUE-LIGHT®

Full spectrum daylight fluorescent lamps



| Type | Watts (W) | Luminous flux (lm/100h) | Luminous efficacy (lm/W) | Glas bulb ø | Length excl. pins (mm) | Base | Packaging | Article no. |
|--|-----------|-------------------------|--------------------------|-------------|------------------------|---------|-----------|-------------|
| True-Light T8 • Natural Daylight 5,500 K • Colour rendering index 1A • Ra96 | | | | | | | | |
| 15 T8 | 15 | 610 | 49 | 26 | 438 | G13 | 25 | 1015 |
| 18 T8 | 18 | 1000 | 52 | 26 | 590 | G13 | 25 | 1035 |
| 30 T8 | 30 | 1500 | 50 | 26 | 895 | G13 | 25 | 1065 |
| 36 T8-1m | 36 | 2200 | 61 | 26 | 970 | G13 | 25 | 1043 |
| 36 T8 | 36 | 2370 | 66 | 26 | 1200 | G13 | 25 | 1036 |
| 38 T8 | 38 | 2450 | 64 | 26 | 1050 | G13 | 25 | 1044 |
| 58 T8 | 58 | 3850 | 66 | 26 | 1500 | G13 | 25 | 1038 |
| True-Light T5 HE • Natural Daylight 5,500 K • Colour rendering index 1A • Ra96 | | | | | | | | |
| 14 T5 | 14 | 925 | 66 | 16 | 549 | G5 | 25 | 1614 |
| 21 T5 | 21 | 1450 | 69 | 16 | 849 | G5 | 25 | 1621 |
| 28 T5 | 28 | 2000 | 71 | 16 | 1149 | G5 | 25 | 1628 |
| 35 T5 | 35 | 2500 | 71 | 16 | 1449 | G5 | 25 | 1635 |
| True-Light T5 HO • Natural Daylight 5,500 K • Colour rendering index 1A • Ra96 | | | | | | | | |
| 24 T5 | 24 | 1300 | 54 | 16 | 549 | G5 | 25 | 1624 |
| 39 T5 | 39 | 2300 | 59 | 16 | 849 | G5 | 25 | 1639 |
| 54 T5 | 54 | 3400 | 63 | 16 | 1149 | G5 | 25 | 1654 |
| 49 T5 | 49 | 3000 | 61 | 16 | 1449 | G5 | 25 | 1649 |
| 80 T5 | 80 | 4700 | 59 | 16 | 1449 | G5 | 25 | 1680 |
| True-Light TC-L • Natural Daylight 5,500 K • Colour rendering index 1A • Ra96 | | | | | | | | |
| 18 TC-L | 18 | 950 | 53 | 37 | 220 | 2G11-4p | 10 | 7218 |
| 24 TC-L | 24 | 1500 | 63 | 37 | 315 | 2G11-4p | 10 | 7224 |
| 36 TC-L | 36 | 2350 | 65 | 37 | 410 | 2G11-4p | 10 | 7236 |
| 40 TC-L | 40 | 2600 | 65 | 37 | 535 | 2G11-4p | 10 | 7240 |
| 55 TC-L | 55 | 3650 | 66 | 37 | 535 | 2G11-4p | 10 | 7255 |
| 80 TC-L | 80 | 4500 | 56 | 37 | 565 | 2G11-4p | 10 | 7280 |
| True-Light compact fluorescent lamps with integrated electronic ballast • Natural Daylight 5,500 K • Colour rendering index 1A • Ra96 | | | | | | | | |
| ESL 15 | 15 | 720 | 48 | 59 | 127 | E27 | 10 | 5015 |
| ESL 20 | 20 | 960 | 48 | 59 | 130 | E27 | 10 | 5020 |
| ESL 23 | 23 | 1200 | 52 | 59 | 147 | E27 | 10 | 5023 |
| True-Light compact fluorescent lamps for use with external ballast • Natural Daylight 5,500 K • Colour rendering index 1A • Ra96 | | | | | | | | |
| CFL-D 10 | 10 | 425 | 42 | 34 | 105 | G24d-1 | 10 | 7020 |
| CFL-D/E 10 | 10 | 425 | 42 | 34 | 100 | G24q-1 | 10 | 7021 |
| CFL-D 13 | 13 | 630 | 48 | 34 | 135 | G24d-1 | 10 | 7022 |
| CFL-D/E 13 | 13 | 630 | 58 | 34 | 130 | G24q-1 | 10 | 7023 |
| CFL-D 18 | 18 | 900 | 50 | 34 | 145 | G24d-2 | 10 | 7024 |
| CFL-D/E 18 | 18 | 900 | 50 | 34 | 145 | G24q-2 | 10 | 7025 |
| CFL-D 26 | 26 | 1300 | 50 | 34 | 175 | G24d-3 | 10 | 7026 |
| CFL-D/E 26 | 26 | 1300 | 50 | 34 | 175 | G24q-3 | 10 | 7027 |

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