SEEING THE FULL SPECTRUM

RGB LED LIGHT SOURCE FOR OPHTHALMIC SURGERY

SOLEA®

Geuder®
Precision made in Germany

ESSENTIAL REQUIREMENTS

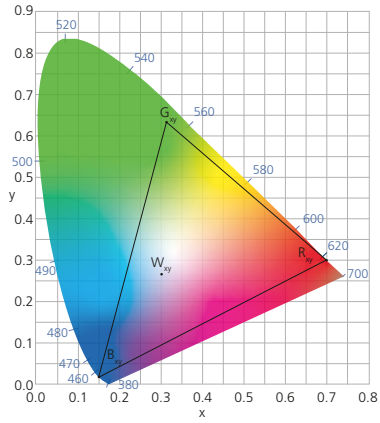
Intraocular illumination of the surgical field plays a fundamental role in vitreoretinal surgery. It has an influence on the success and efficiency of a surgery.

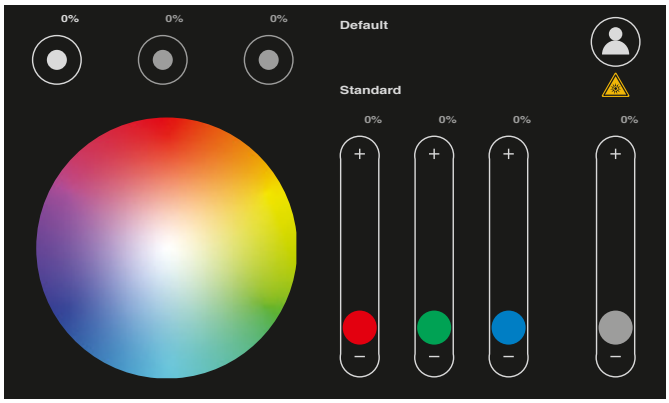
Light sources must meet three main characteristics:

- generate a color rendering that enables correct conclusions about the anatomy
- provide the necessary brightness
- provide a high level of safety for users and patients before, during and after use

THE SPECTRUM OF INNOVATIVE RGB TECHNOLOGY

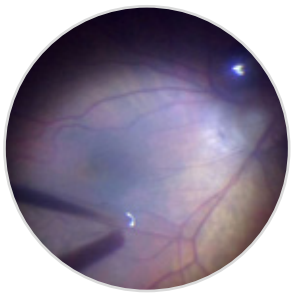
- By displaying 16.7 million colors, the RGB LED technology provides new insights into the posterior segment and thus new applications
- Local contrast enhancement improves the visualization of specific structures in the eye (e.g. vitreous body, ERM, ILM, etc.)
- The SOLEA® opens up new possibilities for making vitreoretinal surgery even safer, in particular through the use of a red LED
- Due to the narrow-band emission of light from the RGB LEDs it makes the use of additional UV or IR filters unnecessary
- The user-friendly control panel and intuitive user interface increase the safety and efficiency in the OR





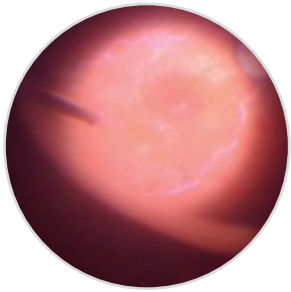
NEW INSIGHTS THROUGH RGB LED

The Geuder SOLEA® light source not only meets essential requirements, but also offers new application possibilities thanks to the new RGB technology.

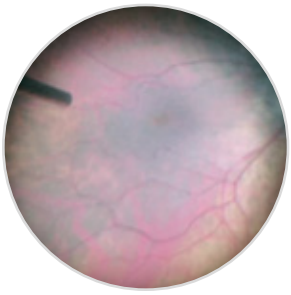


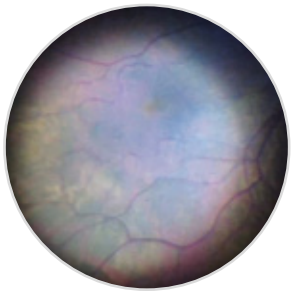
Contrast enhancement through targeted color rendering can visualize the vitreous in central or peripheral vitrectomies up to the vitreous base – here a turquoise-blue hue can increase visibility.

Bluish colors are particularly suitable for ablation and removal of vitreous remnants.



Orange-brown shades can be useful for specific contrast enhancements, for example, during the localization of retinal detachments.



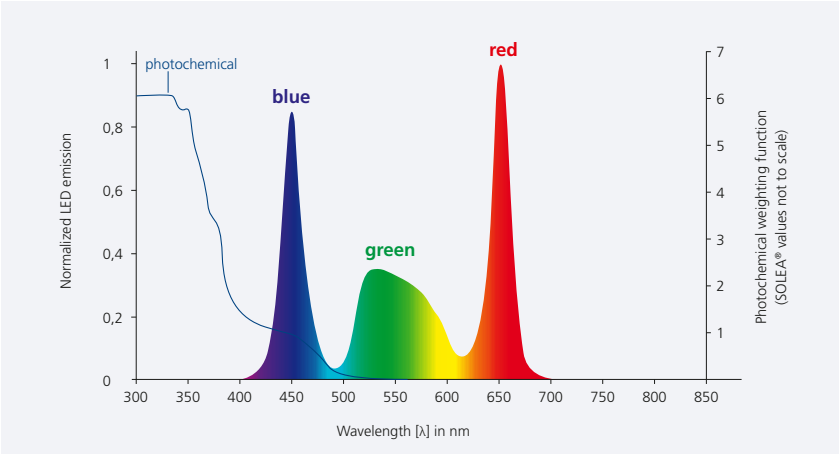


Thanks to the additive color mixing in the RGB color space, the surgeon can use e.g. green hues, to better visualize deeper structures as the choroid.

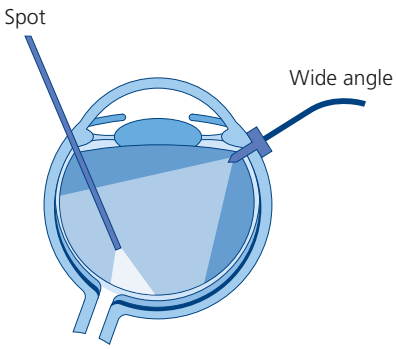
MINIMIZING PHOTOTOXICITY

Despite numerous innovations, some problems in endoillumination of the eye have not yet been solved in recent years. Harmful UV and IR rays arriving from outside are largely filtered by the cornea and lens of the eye, but this natural protective barrier is bypassed during endoillumination.

The greatest danger is the destruction of cells in the retinal pigment epithelium (RPE) due to blue light damage, also called phototoxicity. The irradiation causes so-called oxidative stress on the photoreceptors in the RPE[1], in which oxygen radicals (ROS) can form due to the photochemical processes and thus an increased deposition of e.g. lipofuscin is induced. This problem ultimately leads to increased cell death and thus promotes the development of other pathologies such as macular degeneration (AMD)[2,3].
Studies show that high-energy, visible wavelengths of 415 – 455 nm have the highest potential for oxidative stress on the RPE[2,3]. These wavelengths are increasingly produced by cool white LEDs, which means that a phototoxic light component that cannot be neglected is present.



Blue light has the highest phototoxic potential



Different types of fiber optics and working distances

Other factors influencing the degree of phototoxicity include intensity and exposure duration of the irradiation as well as the size and type of the endoilluminator, but also the distance to the retina.

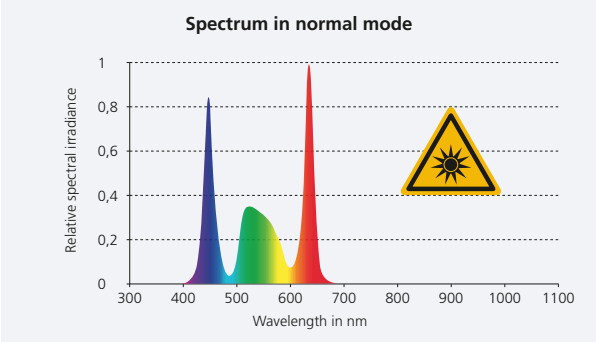
In addition to the selection of the endoilluminator, e.g. wide angle fiber optic, which scatters the light more broadly and thus has lower irradiation intensities on the retina, primarily the selection of the right light source plays a role in reducing the exposure to phototoxic radiation.

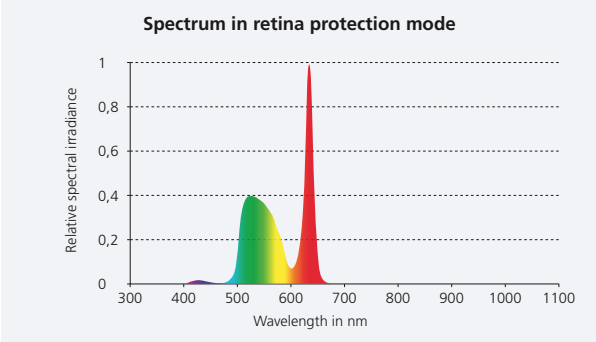
In order to further minimize the risk, appropriate standards such as ISO 15004-2 have been created. These determine, among other things, the safety of the application through limiting values for the maximum irradiation in the eye. Nevertheless, in spite of all the measures taken so far, damage cannot be completely eliminated.

1 Kuse Y, Ogawa K, Tsuruma K, Shimazawa M, Hara H. Damage of photo-receptor-derived cells in culture induced by light emitting diode-derived blue light. Sci Rep. 2014;4:5223. Published 2014 Jun 9. doi:10.1038/srep05223 2 Dunbar M, Melton R. The Lowdown on Blue Light: Good vs. Bad, and Its Connection to AMD. 2014 https://www.revieweducationgroup.com/ce/the-lowdown-on-blue-light-good-vs-bad-and-its-connection-to-amd-109744 3 Tosini G, Ferguson I, Tsubota K. Effects of blue light on the circadian system and eye physiology. Mol Vis. 2016 Jan 24;22:61-72. PMID: 26900325; PMCID: PMC4734149.

TREND-SETTING RETINA PROTECTION

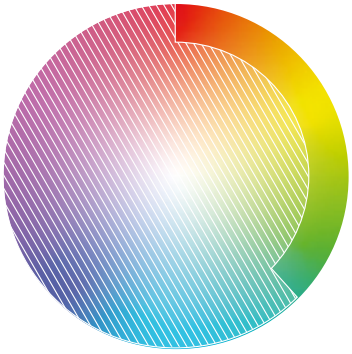
To further reduce the risk of phototoxicity, the new Geuder SOLEA® light source features an innovative retina protection mode. This new function deactivates the blue LED and thus minimizes the phototoxic component almost completely. The remaining light when the blue LED is deactivated is composed of a red and green LED, which due to their wavelengths in the relevant range between 500 and 635 nm have a lower phototoxicity than cool white LEDs.
In addition, the safe irradiation time is increased to at least 30 min (according to ISO 15004-2).





Switching off the blue LED changes the relative spectral irradiation of the SOLEA®

The coloring of the SOLEA®, which can generate 16.7 million colors in normal mode with three RGB LEDs, enables smart lighting concepts to display fine tissue structures that can be better differentiated by means of complementary contrast.



Thanks to the innovative RGB design, the blue LED can be deactivated and thus protective filters can be dispensed. In retina protection mode, despite this restriction, a variation of 65,536 colors can be generated in the orange-yellow-green spectrum.

THE FACTS AT A GLANCE

INNOVATION

- Innovative RGB technology for free color composition and visualization of fine structures
- 16.7 million colors for individual color composition and contrast enhancement

PROTECTION

- RGB LED technology prevents harmful radiation in the UV or IR range without filters
- Retinal protection mode minimizes phototoxic effects by deactivating the blue LED, thus extending the safe surgery time to min. 30 min.
- 3 independent fiber optic outputs with up to 45 lm luminous flux each
- Long durability of the LEDs with up to 60.000 h[4]
- Only ophthalmic surgical light source with red LED

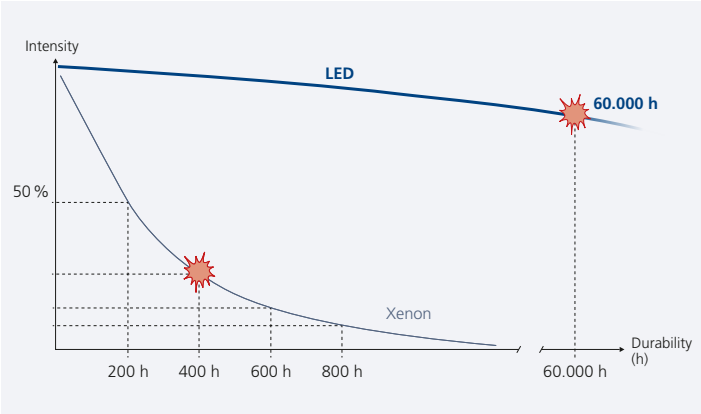
EASY TO USE

- Intuitive handling thanks to 7“ multi touch display (proven PCAP technology - projective capacitive touch screen)
- Individual user profiles and parameter settings
- Auto-save function automatically saves the last values
- Easy cleaning and wipe disinfection of the glass surface with protection class IP33 (including protection against spray water)
- Color temperature from 3,000 - 6,000 K indirectly adjustable via color composition

4 red and blue LED up to 60.000 h, green LED up to 15.000 h

LED DURABILITY

The short durability of the xenon light sources is extended by up to 100 times thanks to the longevity properties of the LEDs. Whereas conventional xenon light sources require a lamp replacement after approx. 300 – 500 h, LEDs allow durability of up to 60,000 h[5] and thus reduce the service effort and follow-up costs. LEDs also have a constant light output, whereas xenon lamps have power losses (approx. 50 % after 200 h).



ADVANTAGES OF STAND-ALONE MODE

A separate and independent light source has two decisive advantages over an integrated overall solution with vitrectomy device:

- Acquisition costs are lower if product innovations and improvements are followed independently of the long innovation cycles of the overall solutions
- In the event of a dysfunction, the entire surgical unit does not fail

5 red and blue LED up to 60.000 h, green LED up to 15.000 h

G-26500

SOLEA® LED LIGHT SOURCE

FOR ENDOILLUMINATION
FOR OPHTHALMIC SURGERIES

OPTIONAL ACCESSORIES

G-26501 **Display foil SOLEA®**
for capacitive touchscreens,
for use with SOLEA®
dimensions: 193 x 137 mm, 50 pcs. per box, sterile

G-26502 **megaTRON® S4 HPS top rack for SOLEA®**

G-26503 **endoTRON® 532 top rack for SOLEA®**
(in combination with megaTRON® S4 HPS)

G-60600 **Equipment Carriage (for megaTRON® S4)**
with swing-out tray (360 x 400 mm),
1 drawer, 4 brakes, cable guards,
dimensions: 108 x 67 x 63 cm (H x W x D)

G-60680 **Equipment Carriage (for megaTRON® S systems)**
with pull-out tray (360 x 491 mm),
4 brakes
dimensions:108 x 67 x 63 cm (H x W x D)

Single-Use Fiber Optic S
UNO Colorline®
Spot, sterile

G-42021 20G, 1 pcs. per box
G-42321 23G, 1 pcs. per box
G-42521 25G, 1 pcs. per box

Single-Use Fiber Optic WA
UNO Colorline®
wide angle, sterile

G-42022 20G, 1 pcs. per box
G-42322 23G, 1 pcs. per box
G-42522 25G, 1 pcs. per box

Single-Use Fiber Optic WS
UNO Colorline®
wide angle, shielded

G-42023 20G, 1 pcs. per box
G-42323 23G, 1 pcs. per box
G-42523 25G, 1 pcs. per box

CE 2797

GEUDER AG reserves the right to make changes to technical details in response to recent developments. GEUDER does not assume liability for the accuracy of each individual statement.

Illustrations not drawn to scale.

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