

## marLED® operating light E9i



### Mechanical design

Operating light consisting of a ceiling tube, a horizontal tracking arm, a spring arm, a cardan joint and a light head. Depending on on-site conditions (ceiling structure), a ceiling anchor plate or an intermediate ceiling assembly is used for mounting the light E3, E9/E9i, V10 (depending on configuration also available as wall mount or mobile version). With its wide range of action and full adjustability in height, the suspension arm system offers unrestricted movability. Thanks to the use of low-weight materials and an innovative design, the weights and torques involved could be minimized, thus enhancing operator convenience at the same time. The light head features several handles for safe and secure positioning of the light, with a seamlessly integrated membrane keypad offering easy, non-sterile control of all light functions. To meet all hygiene requirements for fast and reliable disinfection, the light comes with a closed housing with patented joining technology, smooth surfaces and smooth form transitions. Due to the design and structure of the laminar flow-optimized light head, the light can be recommended for use under "laminar-flow" ceiling panels.

We reserve the right to make alterations.

Due to manufacturing and measuring tolerances, all data relating to lighting systems has a tolerance of +/- 5%.

## Light system

High-performance LEDs of different chromaticity are used as a basis for illumination of the surgical site. The special arrangement of the "light engines" inside the light head ensures shadow-free illumination while providing deep-cavity light at the same time. Computer-calculated optical systems boasting a special microstructure enable the color shadow-free illumination of small or large surgical sites. The process of adjusting the light field diameter involves no moving parts at all and is thus entirely maintenance-free. The LED light consists only of visible light without any infrared content. The large number of altogether 36 individual LEDs provides failure safety with an extremely long service life of the light sources.

## Operation

All operating functions can be controlled via an ergonomic, flush-integrated membrane keypad. Brightness control and light field adjustment are fully electronic, no mechanical components involved. The currently used setting is indicated via an LED segment display on the control panel. High-precision positioning of the light head in any surgical situation is guaranteed by integrated handle elements that are accessible from all sides.

Optional equipment:

- KLS Martin camera system surgiCam® – for highest demands in terms of image quality and resolution. The system can be optionally installed either in the center of the light head or on a separately available video suspension arm.
- Operating function via sterile handle for sterile control of the size of the light field, the backLite function and the color temperature adjustment.

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Electrical Data		marLED® E9i Ceiling
Power module incl. mounting plate, dimensions [L x W x H]	mm	200 x 130 x 105
Power module, primary voltage	V	100 – 240 VAC, 50 – 60 Hz
Fuses, 24-V side	A	10
Fuses, 230-V side	A	5
Power input at 220 – 240 VAC	VA	max. 102
Power input at 100 – 130 VDC	VA	80
Power input at 24 VDC (small light field, brightness level 8)	W	45
Power input at camera		8 VA / 5 W
Voltage at point of wall- or ceiling-mounting	V	24 – 30 VDC
Effective service life of light sources	h	40,000
Voltage stabilization (electronic)		yes
Soft-start option (light does not start immediately with full brightness)		yes
Electronic system meets requirements acc. to VDE and IEC		yes
Classification acc. to MPG (Medical Devices Act / MDD)		I
Protection class acc. to IEC 601		I
Degree of protection: suspension system		IP 30
Degree of protection: light head		IP 42
Conformity		CE

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Photometric Data		marLED® E9i Ceiling
Central illuminance, electrically dimmable from / to	%	30 – 100 % / backLite 5 %
Central illuminance at a distance of 1 m	lx	160,000
Light field diameter (d10, distance 1 m)	mm	170 – 220
Light field diameter (d50, distance 1 m)	mm	95
Color temperature	K	3,600 / 4,300 / 4,600
Color rendering index [Ra (1 – 8)]		95
Red rendering index [R9]		> 85
Total irradiance at 100,000 lux	W/m <sup>2</sup>	293
Total irradiance at 160,000 lux	W/m <sup>2</sup>	469
Luminous efficacy	lm/W	320
Illumination depth (20 % on E <sub>C</sub> max. without refocusing) L1/L2	mm	330 / 430
Illumination depth (60 % on E <sub>C</sub> max. without refocusing) L1/L2	mm	180 / 200
Working range from/to (20 % on E <sub>C</sub> max. without refocusing)	mm	670 – 1,430
Working range from/to (60 % on E <sub>C</sub> max. without refocusing)	mm	820 – 1,200
Shadow dilution with one mask	%	63
Shadow dilution with two masks	%	48
Shadow dilution with one tube	%	99
Shadow dilution with one tube and one mask	%	50
Shadow dilution with one tube and two masks	%	45
UV irradiance for wavelengths < 400 nm	W/m <sup>2</sup>	< 10

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Mechanical Data		marLED® E9i Ceiling
Force required for moving light head up/down	N	14
Force required for swiveling the light head	N	6
Max. vertical force due to weight	N	approx. 450
Single weight (approx.): light head	kg	12
Torque, bending moment	Nm	approx. 290
Permissible ambient temperature range during operation	°C	5° to +40° C
Storage temperature	°C	-10° to +50° C
Shock/impact resistance		8 g / 10 ms
Vibrostability (immunity to vibration)		10 – 150 Hz / 0.15 mm / 2 g
Light head flow contact area	cm <sup>2</sup>	2,775
Light head height (w/o sterile handle)	mm	70
Light head dimensions	mm	685 x 630

Manufacturer: Gebrüder Martin GmbH & Co. KG

Type: marLED® E9i Ceiling

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