Dr. Mach
Medical lighting
+Technology

The **LED** revolution

LED OT-light systems for surgery

Mach LED 5MC, LED 5 Smart and LED 5SC
Mach LED 3MC, LED 3 Smart and LED 3SC
Mach LED 2MC, LED 2 Smart and LED 2SC
Mach video transmission system with SD camera
Mach video transmission system with HD camera

LED OT-LIGHTS

New highlights in the OT

Dr. Mach sets standards in the medical illumination technology for decades.

The new OT-light generation with LED technology supports your professionality by innovative technology and design.

The advantages of the LED technology: adjustable light colour (MC models and Smart models only), a life-span of minimum 50.000 hours and an almost nonexistent heat development in the surgeon's head area and in the wound field.

The advantages already provided by Dr. Mach's light technology with halogen and gas discharge lamps have been maintained: natural colour reproduction, exact illumination of the wound field and easy positioning of the light head.

Your **Dr. Mach** Team

Dr. Mach LED technology

Dr. Mach provides two different LED technologies for its OT-lights:

1. MC models and Smart models

are equipped with **Multi-Colour-chips**. The use of different-coloured LED-chips allows the surgeon to change the colour temperature of the OT-light depending on the preference for a more cold-white light (colour temperatures ≥ 4500 K) or for a warm-white OT-light (colour temperatures ≤ 4250 K). The surgeon can set the colour temperature according to the tissue structure, the surgical application and individual colour sensitivity. This way we avoid tiredness during work: for instance, dazzling effects can be avoided after longer interventions by using a warmer light. On the other hand it is possible to increase the contrast by using higher colour temperatures, which supports the surgeon's power of concentration.

2. SC models

are equipped with **Single-Colour-chips**. Changing the colour temperature is not possible in this case. Of course all the other advantages of the LED technology are also implemented here.

Lighting technology - special features of the MC models and Smart models

Colour composition inside the light head

Dr. Mach already merges the different coloured LEDs by a computer-calculated optical system with light guide and facetted lenses.

This means: The composed light leaves the optical system as white light and is dispersed over the wound field homogeneously.

Colour shadows in the light beam of the OR light caused by the surgeon's head, shoulder or hands are avoided by the colour composition in the optical system.

Changing the light colour

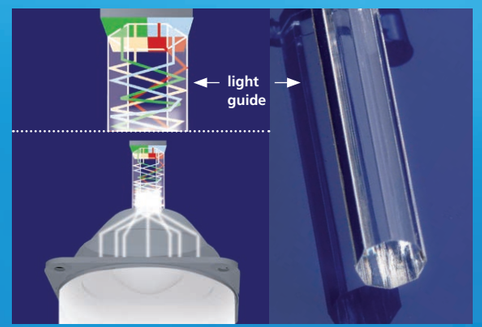
The use of different coloured LEDs makes it possible for the first time in surgery to change the light colours depending on the application.

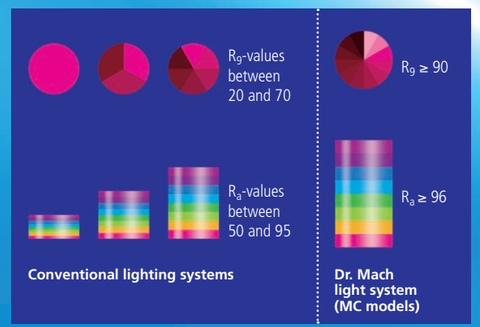
The surgeon has the possibility to choose the optimum OR light according to the tissue type and the wound field texture.

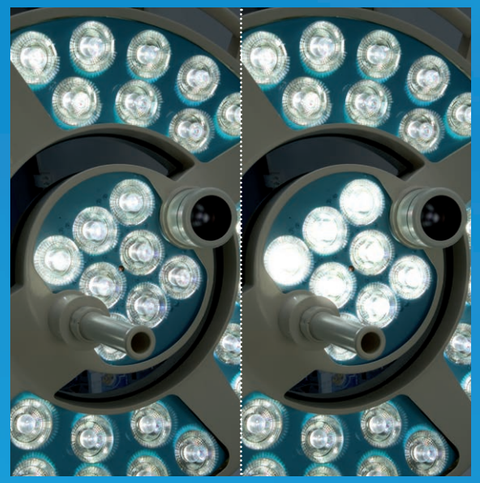
The chips of the MC models are equipped with four variegated LEDs (red, green, warm-white and cold-white).
The chips of the Smart models are equipped with two variegated LEDs (warm-white and cold-white).
The pictures on the right show the LED-Chip and the light guide of a MC-model.

Five different colour temperature values can be set: 3750, 4000, 4250, 4500 and 4750 Kelvin.* The setting can be done either at the key pad on the lamp housing or by a turn of the ring at the sterilisable handle.

* The LED-OT-lights can be equipped optionally with different colour temperature ranges, e.g. from 3500 K to 5000 K.







Common characteristics of the MC models, Smart models and SC models

Facetted multi-lens system

Separately arranged optical systems, each with four LED modules (Multi-Colour models), each with two LED modules (Smart models) or each with one LED module (Single-Colour models), generate their own light field, which increases the contrast effect of the OR light. Light intensities of 160.000 Lux can be attained without difficulty.

Superiour colour rendition

With colour rendering indexes R_a above 96 and R_9 (red) above 90 the surgeon recognizes clearly the tiniest nuances of colour in tissue. The colour rendering index for SC models is R_a = 95. For recognizing the exact colour spectrum of the wound the exact rendition of the red colour range is essential.

R_9 (red) ≥ 90 means for the surgeon a visibly better recognition of details. The colour spectrum of the wound is rendered naturally with rich contrast. The OT-light clearly provides welcome relief for your eyes.

Illumination in depth

You have the possibility to increase the light intensity of the central segment of the OT-light. This enables an optimum illumination of the wound field according to its texture and the shadowing effects.

A high and adequate light intensity is very important especially in cases of narrow and deep wound channels.

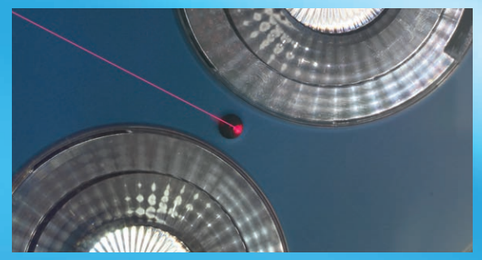
Dr. Mach LED technology

Integrated OT-laser pointer (optional)

The built-in laser pointer always indicates the middle of the light field and helps the surgeon to find the optimal position of the OT-light to the wound field.

The laser pointer can be activated either at the key pad on the lamp housing or by a turn of the ring at the sterilisable handle.

After a short time the laser pointer turns off automatically.



Key pad on the lamp housing

Several light functions can be adjusted electronically, such as:
- Switching ON and OFF
- Illumination in depth
- Laser pointer
- Electronic light intensity control
- Endo-Light
- Changing the colour temperature: 3750, 4000, 4250, 4500, 4750 K (MC models and Smart models only)

Flow properties

During development high attention was paid to the performance of the new LED OR lights in laminar-flow ceiling systems. The flow-enhancing ring form of all light heads (open ring form for the Mach LED 5 models) and the minimal surface avoid any heat increase in the surgeon's head area and create a perfect laminar flow performance, being a basic hygienic requirement in surgery.

Hygiene

The disk sealings of the light outlets and the circumferential sealing cord avoid infiltrations of dust, dirt and liquids inside the lamp head.

Wall panel

The OT-light can be operated at the wall panel (optional equipment against surcharge). Operating the lights can be done either tethered or wireless. Setting of the light functions is done at the light head.

Several light functions can be adjusted electronically, such as:
- Switching ON and OFF
- Illumination in depth
- Electronic light intensity control
- Endo-Light
- Changing the colour temperature (MC models and Smart models only)

Handle

Merging of light fields is done by turning the sterilisable handle. The ring at the top of the handle allows the surgeon to set the most important light functions in the sterile area.

The light functions mentioned below can be set at the ring of sterilisable handle:
- Laser pointer
- Changing the colour temperature (MC models and Smart models only)
- Illumination in depth
- Electronic light intensity control

Cool light

The LED technology is much more effective than conventional light sources such as halogen bulbs. The heat radiation is reduced to a minimum without using any expensive filter technique. The temperature increase in the surgeon's head area is almost nonexistent.

Long life-span/low power consumption

The life-span of more than 50.000 reduces the costs for exchanging and replacing the illuminants considerably, compared with the conventional halogen technology used with former OT-lights.
By implementation of the LED technology the power consumption could be reduced partially with more than 50%.

OT-lights combination:

Mach LED 5 / Mach LED 3 with
integrated video system and monitor

Mach LED 5
160.000 Lux

Mach LED 3 with camera
140.000 Lux

OT-lights combination:

Mach LED 2 / Mach LED 3 with camera

Mach LED 2
115.000 Lux

Mach LED 3 with Kamera
140.000 Lux

OT-lights combination
with fully cardanic suspension for room heights above 2,80 m

OT-lights combination:

Mach LED 5 / Mach LED 3 with standard axis

Mach LED 5
160.000 Lux

Mach LED 3 with camera
140.000 Lux

OT-lights combination
with fully cardanic suspension for room heights above 2,80 m

OT-lights combinations

for low room heights

Mach LED 3 with camera
140.000 Lux

Mach LED 5
160.000 Lux

Mach LED 5 / Mach LED 3 with camera

OT-lights combination with special ceiling arms for low room heights below 2,80 m

Mach LED 3
140.000 Lux

Mach LED 3 / Tandem monitor tray

OT-lights combination with special ceiling arms for low room heights below 2,80 m

Mobile lights

(optionally with integrated video system)

Mach LED 3
140.000 Lux

Mobile light

with integrated power supply

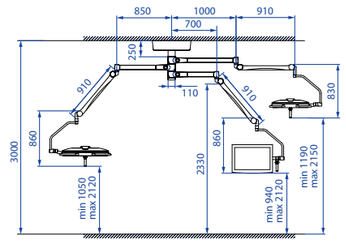
Mach LED 2
115.000 Lux

Mobile light

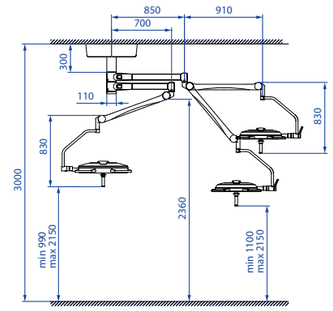
with integrated emergency power unit operating time 3 hours

Technical Data / Dimensions

LED 5 / LED 3 heavy central axis / monitor



LED 3 / LED 2 heavy central axis



LED 5 / LED 3 heavy central axis / low room height

LED 5 / LED 3 standard axis

LED 2 Mobile light

Dimensions in millimeter

Technical Data

Technical Data [1] light system	Mach LED 5MC	Mach LED 5 Smart	Mach LED 5SC
Light intensity in Lux at 1 meter distance	160.000	160.000	160.000
Colour temperature (Kelvin) [3]	3750, 4000, 4250 4500, 4750	3750, 4000, 4250, 4500, 4750	4500
Colour rendering index R_a [2]	96	95	95
Focussable light field size (in cm)	20 – 32	20 – 32	20 – 32
Working distance (in cm)	60 – 150	60 – 150	60 – 150
Diameter of light head (in cm)	72	72	72
Temperature increase in the head area	0,5° C	0,5° C	0,5° C
Electronic light intensity control at the lamphead	standard	standard	standard
Light source LED	160	80	40
Life-span of the LEDs	> 50.000 h	> 50.000 h	> 50.000 h
Total power consumption	160 W	80 W	65 W

Technical Data [1] light system	Mach LED 3MC	Mach LED 3 Smart	Mach LED 3SC
Light intensity in Lux at 1 meter distance	140.000	140.000 [4]	140.000 [4]
Colour temperature (Kelvin) [3]	3750, 4000, 4250 4500, 4750	3750, 4000, 4250 4500, 4750	4500
Colour rendering index R_a [2]	96	95	95
Focussable light field size (in cm)	17 – 28	17 – 28	17 – 28
Working distance (in cm)	60 – 150	60 – 150	60 – 150
Diameter of light head (in cm)	57	57	57
Temperature increase in the head area	0,5° C	0,5° C	0,5° C
Electronic light intensity control at the lamphead	standard	standard	standard
Light source LED	112	56	28
Life-span of the LEDs	> 50.000 h	> 50.000 h	> 50.000 h
Total power consumption	120 W	60 W	45 W

Technical Data [1] light system	Mach LED 2MC	Mach LED 2 Smart	Mach LED 2SC
Light intensity in Lux at 1 meter distance	115.000	115.000 [5]	115.000 [5]
Colour temperature (Kelvin) [3]	3750, 4000, 4250 4500, 4750	3750, 4000, 4250 4500, 4750	4500
Colour rendering index R_a [2]	96	95	95
Focussable light field size (in cm)	17 – 28	17 – 28	17 – 28
Working distance (in cm)	60 – 150	60 – 150	60 – 150
Diameter of light head (in cm)	49	49	49
Temperature increase in the head area	0,5° C	0,5° C	0,5° C
Electronic light intensity control at the lamphead	standard	standard	standard
Light source LED	84	42	21
Life-span of the LEDs	> 50.000 h	> 50.000 h	> 50.000 h
Total power consumption	70 W	55 W	30 W

[1] Further technical details in the data sheet of the lamp, available upon request
[2] R_a is an average of R_1 = burnt pink, R_2 = mustard yellow, R_3 = yellow green, R_4 = light green, R_5 = turquoise blue, R_6 = skyviolet, R_7 = violet, R_8 = lilac. Maximum value = 100.
[3] optionally available with different colour temperature ranges
[4] optionally available with 160.000 Lux
[5] optionally available with 130.000 Lux

Integrated OT video system

HD camera / SD camera

Technical data Dr. Mach camera	HD	MFB-MO (SD)
	High Definition camera with digital transmission for visual communication	Colour image camera for visual communication (PAL)
Objectiv system	30-fold optical zoom, 12-fold digital zoom f = 4.3 to 129 mm F1.6 – 4.7 auto-focus	36-fold optical zoom, 12-fold digital zoom f = 3.4 to 122.4 mm F1.6 – 4.5 auto-focus
Video signal	HD: 1080i / 50; 720p / 50 or 1080i / 59.94; 720p / 59.94	–
Video Output	HD-component	Y/C
Image points	approx. 2.000.000 pixels	752 (H) x 582 (V)
Horizontal resolution	–	Over 530 lines
Humidity	20 – 80%	20 – 85%
Dimensions (Ø, length)	80 x 150 mm	80 x 150 mm
Weight	900 g	900 g
Interference radiation in acc. with	FCC class A	FCC class A

Technical data

The Dr. Mach HD- and SD-video systems offer highest picture quality with a maximum movability of the light.

Advantages of the new Dr. Mach video system

- uniform preparation for HD- and SD-camera
- 360° continuous rotation in all major joints
- easy-mounting due to video signal transmission through the supply cables
- camera control with a serial interface or a second control unit
- easy fixation of the camera in another OT
- streaming, conversion or storage solution available on request

HD resolution

With the transmission of high-resolution pictures of the surgeries and the medical interventions we fulfill your visual requirements.

Advantages:
A brilliant picture quality with high depth of field and increased detail reproduction means a better recognition of the details in the woundfield by the surgeon or the physician.

Camera technology

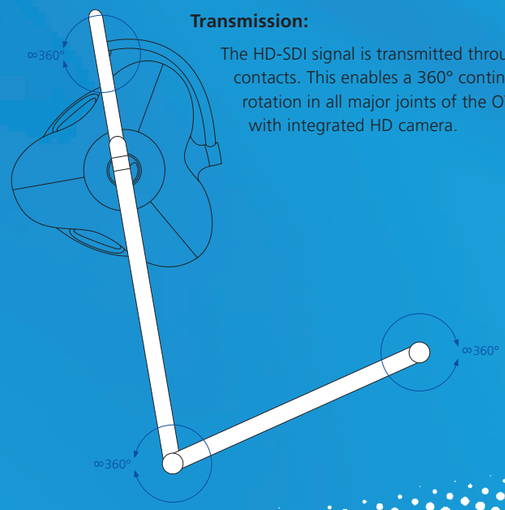
The HD-camera with 30-fold optical zoom and the SD-camera with 36-fold optical zoom are equipped with auto-focus, auto-iris and picture rotation. The cameras are operated with a control unit.

Several camera functions can be adjusted on the control unit, such as:

- Switching ON and OFF
- Switching between 1080i and 720p – Dr. Mach HD-camera only
- Focus (automatic/manual)
- Iris (automatic/manual)
- Zoom
- Picture rotation
- Frozen image

Transmission:

The HD-SDI signal is transmitted through sliding contacts. This enables a 360° continuous rotation in all major joints of the OT-light with integrated HD camera.



The LED revolution

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