The **LED** revolution

LED OT-light systems for surgery

Mach LED 5\textsuperscript{MC} and LED 5\textsuperscript{sc}
Mach LED 3\textsuperscript{MC} and LED 3\textsuperscript{sc}
Mach video transmission system with SD camera
Mach video transmission system with HD camera
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 only), a life-span of minimum 40,000 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 Team

Dr. Mach LED technology:
- Lighting technology - special features of the MC models
- Common characteristics of the MC models and SC models

OT-lights combinations:
- Mach LED 5/Mach LED 3 with camera/monitor
- Mach LED 5/Mach LED 3
- Mach LED 5/Mach LED 5
- Mach LED 3/Mach LED 3 with camera/monitor

OT-lights combinations for low room heights:
- Mach LED 5/Mach LED 3 with camera
- Mach LED 3/VarioView

Mach LED 3 mobile lights:
- Mach LED 3 with integrated power supply
- Mach LED 3 with emergency power unit

Technical data

Integrated video system:
- SD camera
- HD camera
Facetted multi-lens system

A multitude of computer-calculated facetted lenses guarantees homogeneity and lowest shadiness in the light field.

Separately arranged optical systems, each with four LED modules (Multi-Colour 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. $R_9(\text{red}) \geq 90$ means for the surgeon a visibly better recognition of details.

The colour spectrum of the wound is rendered naturally with rich contrast. The OR-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 OR-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.

Common characteristics of the MC models and SC models

1. MC 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 $\geq 4500$ K) or for a warm-white OT-light (colour temperatures $\leq 4250$ 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, or they can be ordered for surcharge (integrated laser pointer).

Lighting technology - special features of the MC models

Colour composition inside the light head

Dr. Mach already merges the different coloured LED’s 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 LED’s 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.

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 right-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.
Dr. Mach LED technology

Integrated OT-laser pointer (optional)

The integrated OT-laser pointer allows the indicator 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 keypad or at the OT light head of the OT-lights combination.

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
- Changing the colour temperature (3750, 4000, 4250, 4500, 4750 K)

Flow properties

During development high attention was paid to the performance of the new LED OR lights in modern 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

Height adjustability of the light system and the horizontal and vertical optical axis of the OT light head under the lamp head.

Wall panel

The OT light head can be operated at the wall panel (optional equipment against surcharge). The keypad and the laser pointer can be activated on the wall panel as well as the OT lights.

Several light functions can be adjusted electronically, such as:

- Switching ON and OFF
- Illumination in depth
- Laser pointer
- Electronic light intensity control
- Changing the colour temperature (MC models only)

Handle

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

The light functions mentioned below can be set at the ring of sterilizable handle:

- Laser pointer (by a left-turn of the ring on the top of the handle)
- Changing the colour temperature (MC models only) or illumination in depth (by a right-turn on the top of the handle)

Cool light

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

Long life-span/low power consumption

The life-span of more than 40.000 operating hours reduces the costs for exchanging and replacing the illuminants considerably, compared with the conventional halogen technology used for 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 with camera/Mach LED 3
160,000 Lux

Mach LED 5
160,000 Lux

Mach LED 3
160,000 Lux

Mach LED 5
160,000 Lux

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

Seite 11 Seite 10 Seite 12 Seite 13 Klappseite rechts 2 mm kürzer
Klappseite links 2 mm kürzer
Mach LED 3 with camera
140.000 Lux

OT-lights combinations for low room heights

Mach LED 3 with camera
140.000 Lux

Mach LED 5
160.000 Lux

Mach LED 3/Mach LED 3 with integrated video system and monitor
OT-lights combination with fully carbon suspension for room heights above 2,80 m

Mach LED 3/VarioView
OT-lights combination with special ceiling arm for low room heights below 2,00 m
**Technical data**

<table>
<thead>
<tr>
<th>Machine</th>
<th>Mach LED 3sc</th>
<th>Mach LED 3MC</th>
<th>Mach LED 5MC</th>
<th>Mach LED 5SC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luminance depth</td>
<td>100%</td>
<td>130%</td>
<td>120%</td>
<td>130%</td>
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<tr>
<td>Colour rendering</td>
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<td>40 - 100 cm</td>
<td>17 - 28 cm</td>
<td>40 - 100 cm</td>
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<td>Colour temperature</td>
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<td>4500 K</td>
<td>4500 K</td>
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<tr>
<td>Electronic light intensity control</td>
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<td>standard</td>
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<tr>
<td>Lens adjustment</td>
<td>160 - 150 cm</td>
<td>120 - 150 cm</td>
<td>120 - 150 cm</td>
<td>100 - 150 cm</td>
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<tr>
<td>Dimensions</td>
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<td>72 cm x 57 cm</td>
<td>72 cm x 57 cm</td>
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<td>16 - 24 Volt DC</td>
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<td>Power consumption</td>
<td>60 W</td>
<td>65 W</td>
<td>45 W</td>
<td>40 W</td>
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<td>Dimensions</td>
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<td>483 x 483 x 583 mm</td>
<td>483 x 483 x 583 mm</td>
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<td>0 to +40 °C</td>
<td>0 to +40 °C</td>
<td>0 to +40 °C</td>
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<tr>
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<td>20 - 85 %</td>
<td>20 - 85 %</td>
<td>20 - 85 %</td>
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<td>100 mm 100 mm VESA</td>
<td>100 mm 100 mm VESA</td>
<td>100 mm 100 mm VESA</td>
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<tr>
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<td>4,8 kg</td>
<td>8,2 kg</td>
<td>4,8 kg</td>
<td>8,2 kg</td>
</tr>
</tbody>
</table>

*Optionally available with 140,000 lux*
Integrated video system

SD camera

A Sony camera with 36-fold optical zoom, auto-focus, auto-iris and image rotation is used. Via remote control panel it can be controlled at the same time from an auditorium or other rooms.

Camera remote control

- 36-fold optical zoom
- Focus-control (automatic/manual)
- Iris-control (automatic/manual)
- Colour-control
- Frozen image
- Optional with image rotation

Digital video system

By a new digital camera remote control you can now receive digital video signals for the computer or network. Analog camera images are converted in MPEG4-video signals. These are available through a RJ45 interface at the remote control and a network cable.

Advantages:
You don’t need a video card any longer. The images can be directly saved on the computer if sufficient capacity is available. Nevertheless you can further record the signals on video or DVD-recorders. For this the remote control panel is equipped with two S-video (Y/C) connectors.

Available digital video systems (option against surcharge)

Video system DIGITAL ECO
Every computer in the network has access to the video images and they can be saved on a hard disc drive of sufficient capacity.

Video system DIGITAL PC-CONTROL
As with this video system, Digital Eco every computer in the network has access to the video images and they can be saved on a hard disc drive of sufficient capacity. Additionally the camera can be controlled by a specially designed software through the PC-screen. This is done by an IP-address designated for the camera remote control.

Technical data SD camera

- Colour image camera for visual communication (PAL/NTSC)
- 36-fold optical zoom, 12-fold digital zoom
- f = 3.4 to 122.4 mm, F1.6-4.5, auto-focus (integrated focusing system)
- Video exit 75 Ohm VBS: 1.0 Vp-p., Sync. Negative, Y/C Output
- Image points 752 (H) x 582 (V)
- Horizontal resolution: Over 530 lines
- Humidity: 20 - 85%
- Dimensions (Ø, length): 80 x 150 mm
- Weight: 900 g
- Interference radiation in acc. with FCC class A

Dr. Mach has developed an innovative video transmission system with a high-definition camera with digital data transmission for visual communication.

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 wound field by the surgeon or the physician.

Camera technology

The HD camera is equipped with 10-fold optical zoom, auto-focus, auto-iris and picture rotation. The camera is operated with a control unit.

Several camera functions can be adjusted on the control unit, such as:
- Switching ON and OFF
- Switching between HD-mode (1080i) and SD-mode (720p)
- 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.

Available digital video systems (option against surcharge)

Video system DIGITAL ECO
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Video system DIGITAL PC-CONTROL
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Technical data HD camera

- High Definition camera with digital transmission for visual communication
- 10-fold optical zoom, 12-fold digital zoom
- f = 5.1 to 51 mm, F1.8-2.1
- auto-focus (integrated focusing system)
- Video signal
  - HD: 1080i/59.94, 1080i/50, 720p/59.94, 720p/50
  - SD: NTSC (CROP), NTSC (SQUEEZE), PAL (CROP); PAL (SQUEEZE)
- Image points: approx. 2,000,000 pixels
- Humidity: 20 - 80%
- Dimensions (Ø, length): 80 x 150 mm
- Weight: 900 g
- Interference radiation in acc. with FCC class A

For detailed informations please ask for our special catalogue for single lights.
The LED revolution