



Dr. Mach
Medical lighting
+ Technology

The **LED** revolution

LED OT-light systems for surgery

Mach LED 5mc and LED 5sc

Mach LED 3mc and LED 3sc

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 professionalism 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.

Dr. Mach LED technology:

Lighting technology - special features of the MC models 4

Common characteristics of the MC models and SC models 5-7

OT-lights combinations:

Mach LED 5/Mach LED 3 with camera/monitor ... 8-9

Mach LED 5 with camera/Mach LED 3 10-11

Mach LED 5/Mach LED 5 12-13

Mach LED 3/Mach LED 3 with camera/monitor 14

OT-lights combinations for low room heights:

Mach LED 5/Mach LED 3 with camera 15

Mach LED 3/VarioView 15

Mach LED 3 mobile lights:

Mach LED 3 with integrated power supply 16

Mach LED 3 with emergency power unit 16

Technical data 17

Integrated video system:

SD camera 18

HD camera 19

Your **Dr. Mach** Team
Medical lighting
+ Technology

Dr. Mach LED technology

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

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 ≥ 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, or they can be ordered for surcharge (integrated laser pointer).

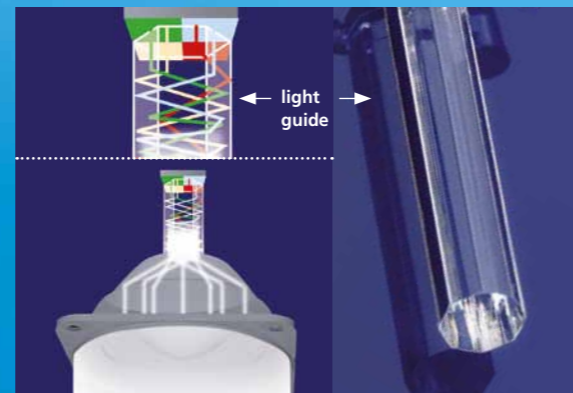
Lighting technology - special features of the MC models

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 faceted 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.



Common characteristics of the MC models and SC models

Facetted multi-lens system

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

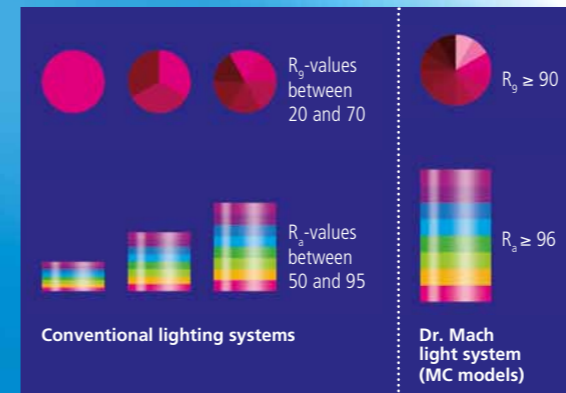
Separately arranged optical systems, each with four LED modules (Multi-Colour models) or each with one LED module (Single-Colour models), generate their own light field, which increases the contrast effect of the OR light. Light intensities of 160.000 Lux can be attained without difficulty.



Superiour colour rendition

With colour rendering indexes R_a above 96 and R_3 (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.

$R_3(\text{red}) \geq 90$ means for the surgeon a visibly better recognition of details. The colour spectrum of the wound is rendered naturally with rich contrast. The 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 left-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



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). The light functions can be adjusted on the wall panel as well as on the key pad of the light.

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 (MC 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 (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 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

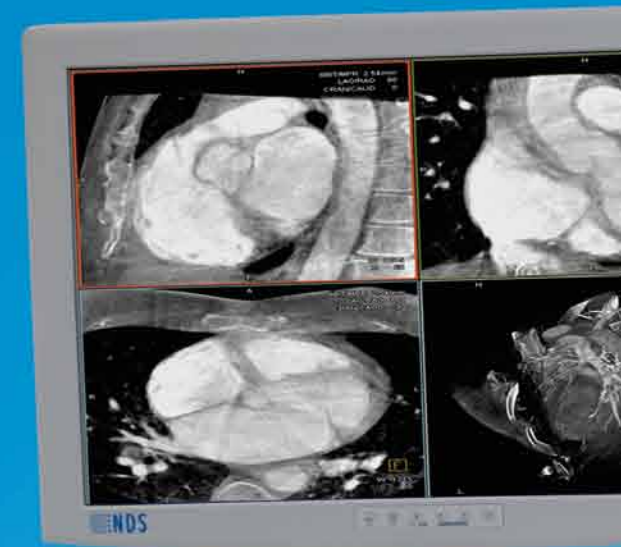
The life-span of more than 40.000 operating hours reduces the costs for exchanging and replacing the illuminants considerably, compared with the conventional halogen technology used with former OT-lights. By implementation of the LED technology the power consumption could be reduced partially with more than 50%.



OT-lights combination: Mach LED 5 and Mach LED 3 with integrated video system and monitor



Mach LED 5
160.000 Lux



OT-lights combination:

Mach LED 5 with camera/Mach LED 3



Mach LED 5 with camera
160.000 Lux

Mach LED 3
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 5



Mach LED 5
160.000 Lux

Mach LED 5
160.000 Lux

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



Mach LED 3 with camera
140.000 Lux



OT-lights combinations for low room heights



Mach LED 3
140.000 Lux

Mach LED 3 with camera
140.000 Lux

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



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

Mach LED 3 mobile lights (optionally with integrated video system)



Mach LED 3
140.000 Lux

Mobile light
with integrated power supply

Mach LED 3
140.000 Lux

Mobile light
with integrated emergency power unit
operating time 3 hours

Technical data OT-lights	Mach LED 5Mc	Mach LED 3Mc
Light intensity Lux at 1 meter distance	160.000	140.000 ⁽¹⁾
Illumination depth 20%	1500 mm	1200 mm
Illumination depth 60%	400 mm	520 mm
Colour rendering index R_a ⁽²⁾	≥ 96	≥ 96
Colour rendering index R_a (red) ⁽³⁾	≥ 90	≥ 90
Focussable size of the light field (in cm)	20 - 32	17 - 28
Colour temperature (Kelvin) ⁽⁴⁾	3750, 4000, 4250, 4500, 4750	3750, 4000, 4250, 4500, 4750
Electronic light intensity control at the lamp head	standard	standard
Dimming range	5 - 100%	5 - 100%
Temperature increase in head area	0,5° C	0,5° C
Total power consumption	160 W	120 W
Number of LED's	160	112
Life-span of the LED's	> 40.000 h	> 40.000 h
Diameter of the lamp head (in cm)	72	57
Working distance (in cm)	60 - 150	60 - 150
Height adjustment (in cm)	118	118

Technical data OT-lights	Mach LED 5sc	Mach LED 3sc
Light intensity Lux at 1 meter distance	160.000	140.000
Illumination depth 20%	1500 mm	1200 mm
Illumination depth 60%	400 mm	520 mm
Colour rendering index R_a ⁽²⁾	95	95
Focussable size of the light field (in cm)	20 - 32	17 - 28
Colour temperature (Kelvin)	4500	4500
Electronic light intensity control at the lamp head	standard	standard
Dimming range	5 - 100%	5 - 100%
Temperature increase in head area	0,5° C	0,5° C
Total power consumption	65 W	45 W
Number of LED's	40	28
Life-span of the LED's	> 40.000 h	> 40.000 h
Diameter of the lamp head (in cm)	72	57
Working distance (in cm)	60 - 150	60 - 150
Height adjustment (in cm)	118	118

Technical data

Technical data Monitors	NDS Endovue 19 ⁽⁵⁾	NDS Radiance 19HD ⁽⁵⁾	NDS Radiance 23HD ⁽⁵⁾	NDS Radiance 26HD ⁽⁵⁾
Viewing area (mm)	483 (4:3), 19"	483 (4:3), 19"	584 (16:10), 23"	649 (16:10), 26"
Picture size (mm)	376 x 301	376 x 301	495 x 310	550 x 344
Pixel pitch (mm)	0,294	0,294	0,258	0,287
Resolution	1280 x 1024	1280 x 1024	1920 x 1200	1920 x 1200
Luminance	350 cd/m ²	450 cd/m ²	300 cd/m ²	500 cd/m ²
Contrast ratio	650:1	650:1	700:1	800:1
Number of colours	16,8 Million	16,8 Million	16,8 Million	16,8 Million
Viewing angle	170°	170°	176°	178°
Response	10 - 16 ms	10 - 16 ms	10 - 16 ms	4 - 12 ms
Video inputs	RGBS / YPbPr VGA S-Video Composite RS-232	DVI HD-SDI, SDI RGBS, YPbPr VGA S-Video Composite	DVI HD-SDI, SDI RGBS, YPbPr VGA S-Video Composite	DVI HD-SDI, SDI HD-RGBS, RGBS HD-YPbPr, YPbPr VGA Sync-On-Green S-Video Composite
Video outputs	S-Video RGBS / YPbPr Composite	SDI RGBS, YPbPr VGA Sync-On-Green S-Video Composite	SDI RGBS, YPbPr VGA Sync-On-Green S-Video Composite	DVI HD-SDI, SDI HD-RGBS, RGBS HD-YPbPr, YPbPr Sync-On-Green S-Video Composite
Power supply	16 - 24 Volt DC	16 - 24 Volt DC	16 - 24 Volt DC	22 - 24 Volt DC
Power consumption	60 W	65 W	80 W	115 W
Dimensions (mm)	465 x 400 x 98	465 x 400 x 98	546 x 366 x 98	627 x 427 x 101
Temperature	0 to +40 °C	0 to +40 °C	0 to +40 °C	0 to +40 °C
Humidity	20 - 85 %	20 - 85 %	20 - 85 %	20 - 85 %
Mounting	100 mm VESA	100 mm VESA	100 mm VESA	100 mm VESA
Weight	6,4 kg	6,8 kg	8,2 kg	8,3 kg

(1) optionally available with 140.000 Lux

(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) R_9 is the value for the rendering of the colour red. This is not used in calculating the general colour rendering index R_a . The values for conventional operating lights are between 20 and 70. Maximum value = 100. Values of more than 90 allow the surgeon to recognize details better in the wound area.

(4) optionally available with different colour temperature ranges

(5) Manufacturer: National Display Systems

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.

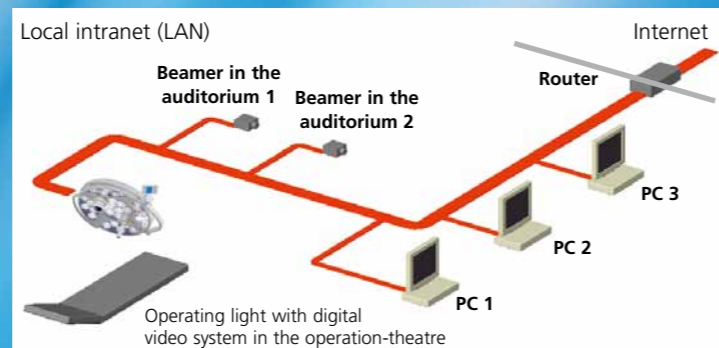
Video system DIGITAL PC-CONTROL

As with the 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	
Dr. Mach camera	MFB-MO
Colour image camera for visual communication (PAL/NTSC)	
Objectiv systems	36-fold optical zoom, 12-fold digital zoom f = 3.4 to 122.4 mm, F1.6-4.5, auto-focus (integr. focussing 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

No additional cables are needed for the camera.
By a special electronic design the power supply of the operating light is used for the transmission of the control- and video signals.



Technical data	
Dr. Mach HD camera	
High Definition camera with digital transmission for visual communication	
Objectiv system	10-fold optical zoom 12-fold digital zoom f = 5.1 to 51 mm F1.8-2.1 auto-focus (integr. focussing 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.

HD camera

NEW

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 woundfield by the surgeon or the physician.

Camera technology

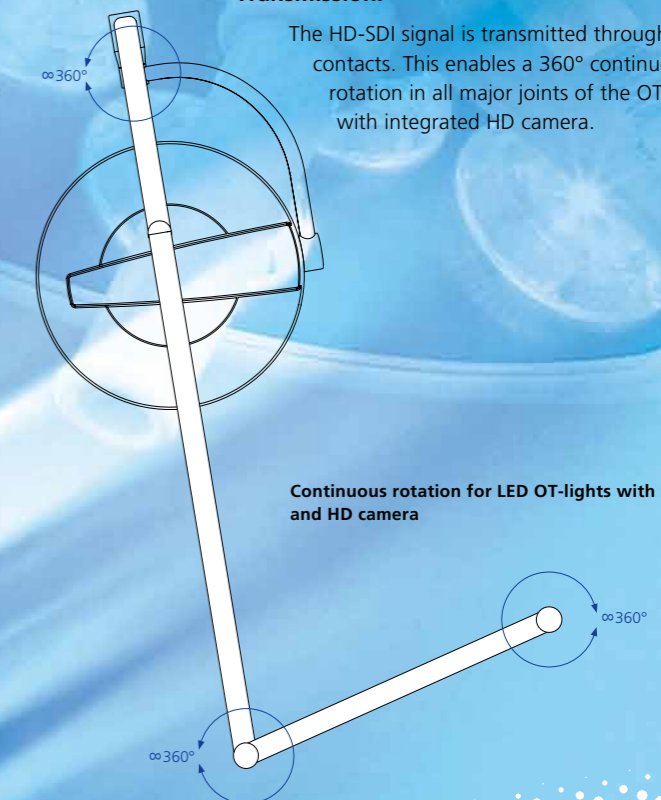
The HD camera is equipped with 10-fold optical zoom, auto-focus, auto-iris and picture rotation. The camera is operated with a control unit.

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.



Continuous rotation for LED OT-lights with SD and HD camera

The LED revolution

Dr. Mach GmbH & Co. KG

Flossmannstraße 28 · D-85560 Ebersberg
Phone: +49 (0) 8092 / 20 93-0 · Fax: +49 (0) 8092 / 20 93-50
www.dr-mach.com · e-mail: info@dr-mach.de