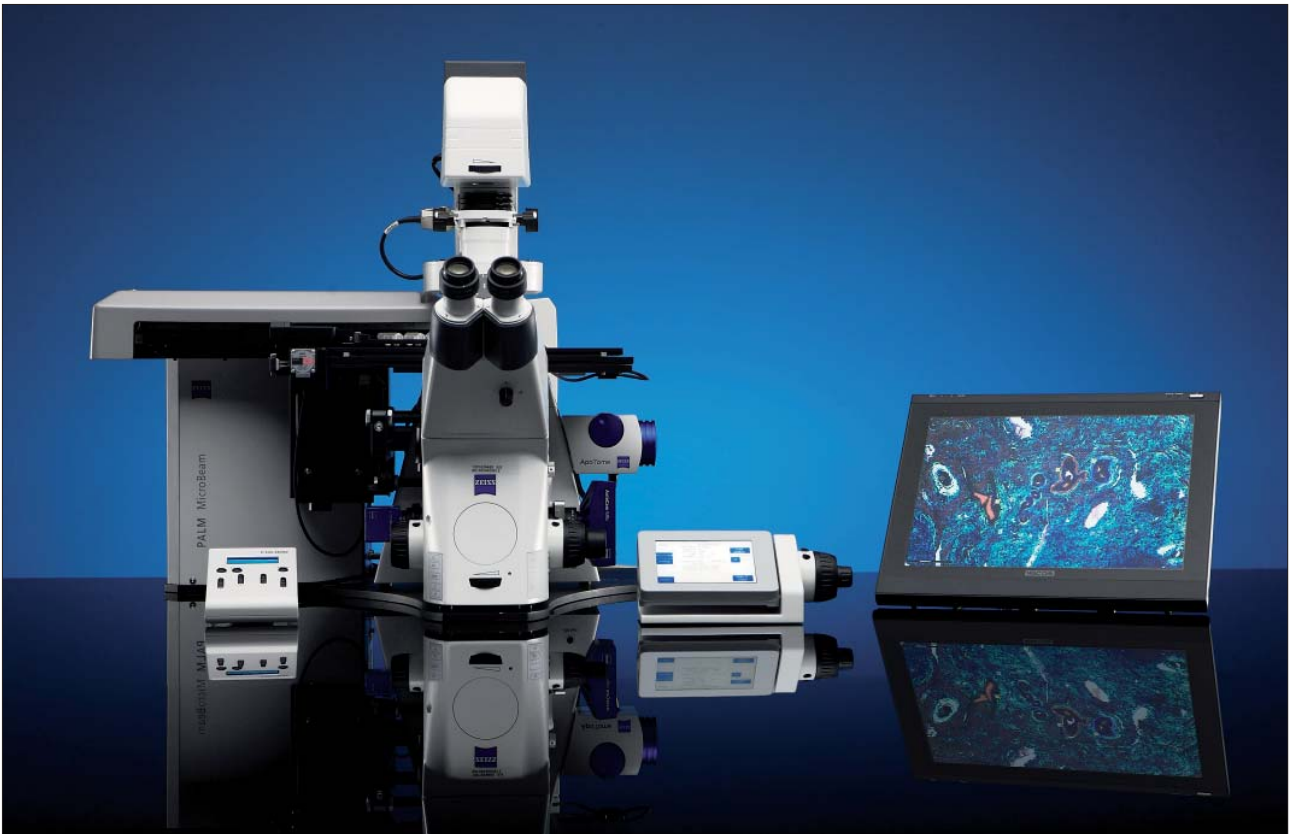


# Technical Information

PALM Systems

**PALM MicroBeam**



Automated and non-contact Laser Capture Microdissection (LCM)



We make it visible.

# Technical Information

## PALM Systems

### PALM MicroBeam - General Description

**PALM Systems** have proven to be the ultimate technology for **non-contact Laser Capture Microdissection (LCM)** and micromanipulation. The innovative laser technologies can be put to a great variety of applications and open up previously unknown possibilities in modern medicine, biotechnology and pharmaceutical research.



#### **PALM MicroBeam**

works with a pulsed frequency tripled solid state laser (wavelength: 355 nm) which is coupled via the fluorescence path into a research microscope. That enables simultaneous fluorescence illumination and laser manipulation. The laser can be operated automatically by PALM RoboSoftware. The beam diameter can be focused to a spot smaller than 0.6  $\mu\text{m}$ , dependent on the magnification and numerical aperture of the used objectives. This allows precise laser manipulation at a low scale.

The laser wavelength does not interfere with biomolecules or cell viability and preserves the molecular biological information.

PALM Systems are well known for their precision and reliability. Thus it is ensured, that the laser beam path is in parallel to the optical axis of the light microscope and the laser focus is stable in its prealigned position without any drift. This is a prerequisite for laser micromanipulations with highest possible precision in all day use.

# Technical Information

The **PALM RoboSoftware** desktop has been architecturally redesigned with a philosophy that is focused on simplicity and convenience. Our new software is more agile than ever and brings PALM MicroBeam core system functionality closer to your fingertips. Additionally the new software resides in an environment that is fully conversant with Carl Zeiss technology in the form of the new AxioObserver microscope, AxioCam digital cameras, and Axio-Vision advanced imaging software.

## **Control has never been easier:**

- Create and run multidimensional imaging environments for your PALM MicroBeam system
- View specimen regions in full context with the overview functions of Slide Navigator
- Multiplex your sample collection for higher recovery throughput with PALM RoboMover
- Quality control; with CapCheck you can see your microdissected specimen

## **The plus-points at a glance:**

- Absolute purity in sample extraction
- Maximum preservation of the material
- Combined microdissection and high-end imaging technology
- Intuitive user interface
- Digital camera technology
- Application support and comprehensive service

### *Regulatory Notice:*

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## **Carl Zeiss MicroImaging GmbH**

Location Munich

Kistlerhofstr. 75

81379 München, Germany

Phone: +49 (0) 89 90 9000-800

E-Mail: [palm-info@zeiss.de](mailto:palm-info@zeiss.de)

Web: [www.zeiss.de/microdissection](http://www.zeiss.de/microdissection)

July 2008

# Technical Information

## PALM Systems

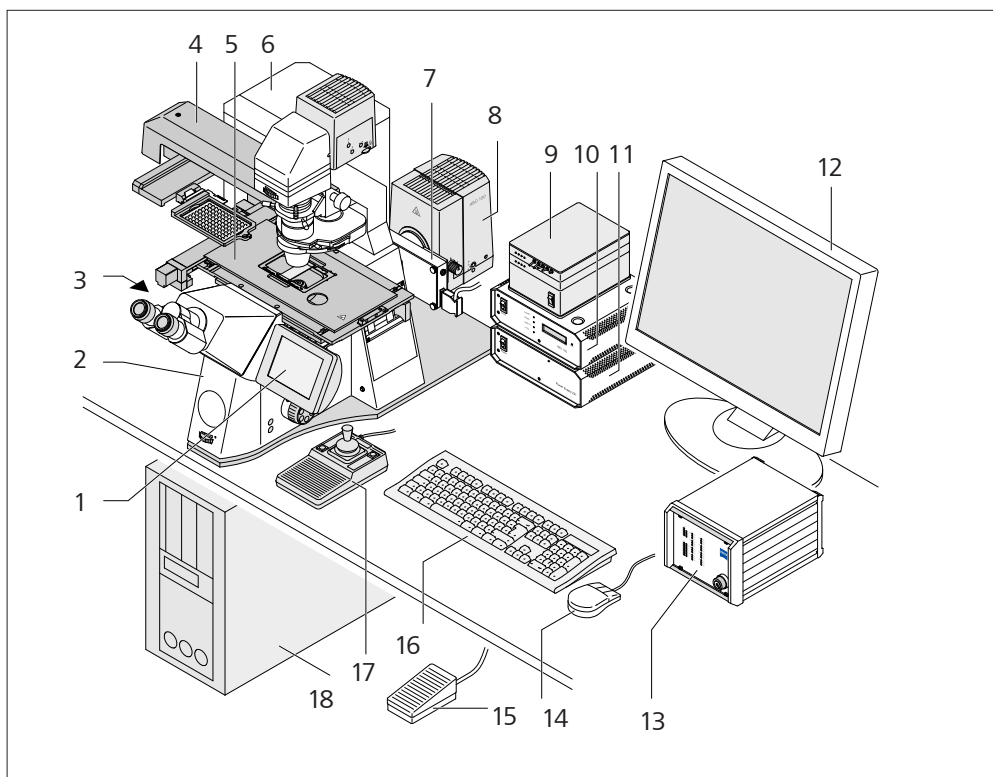
### PALM MicroBeam - Configuration

#### PALM MicroBeam

is a modular system with various equipment and can be individually prepared by Carl Zeiss MicroImaging GmbH according to your specific application requirements. In all cases the laser system integrates

a high quality research microscope from Carl Zeiss which may be used as an independent device for standard microscope operations. Various options for additional applications are possible.

A typical **PALM MicroBeam** workstation consists of the following components:



- |   |                             |    |  |
|---|-----------------------------|----|--|
| 1 | TFT-display                 | 10 | Power supply (fluorescence illumination) |
| 2 | Microscope: Axio Observer   | 11 | Power supply (microscope)                |
| 3 | Digital camera              | 12 | Monitor                                  |
| 4 | PALM RoboMover              | 13 | ControlUnit                              |
| 5 | PALM RoboStage II           | 14 | Mouse                                    |
| 6 | Laser unit and laser        | 15 | Foot stepper                             |
| 7 | Filter wheel                | 16 | Keyboard                                 |
| 8 | Fluorescence illumination   | 17 | Joystick                                 |
| 9 | Control unit (filter wheel) | 18 | Computer                                 |

# Technical Information

## Working Place

- The system should be installed in a well-ventilated room, which is adequately large (about 6 square meters).
- For the aluminum plate a table measuring at least 152 x 91 cm, on which the system will be set up, and with a load carrying capacity of the table of  $>90 \text{ kg/m}^2$  is necessary. The total weight is approx. 200 kg, depending on the configuration.
- Power supply: 115/230 VAC / 16 VA safety fuse
- Three properly installed socket outlets with earthing contact.
- The device may be operated at the following ambient conditions:  
Ambient temperature of the air:  $+15^{\circ}\text{C}$  to  $30^{\circ}\text{C}$  ( $59^{\circ}\text{F}$  to  $86^{\circ}\text{F}$ ), air humidity; 20% to 70%, not condensing. To ensure highest precision of the stage temperature stability during operation must be  $\pm 1^{\circ}\text{C}$ .

## Microscope

Recommended for optical laser micromanipulations are high optical and mechanical quality research microscopes equipped with an epifluorescence illumination path. PALM Systems are combined with the Axio Observer research microscope series from Carl Zeiss. The technology converts on one hand the research microscope into a reliable, high-precision laser tool, but it can also be used as a normal research microscope without any restrictions on the standard functions of light microscopy: Techniques like phase contrast, PlasDIC or fluorescence are possible, some of them even in combination with the lasers.

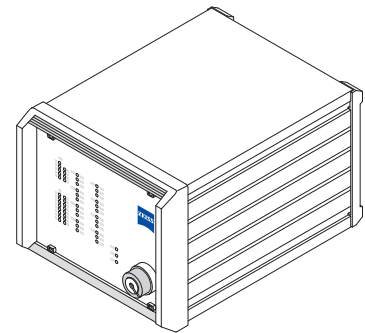
## Laser units

The laser unit contains the laser and all the necessary optics to guide the laser into the microscope, to control the laser energy and to adjust the laser focus that it coincides with the optical focus of the microscope at the object plane.

## PALM ControlUnit

PALM ControlUnit runs and controls the movement of PALM RoboStage, PALM CapMover or PALM RoboMover and enabling the lasers energy- and focus adjustment. The key-switch also operates the mains for the single components of your system. If you want to run single components as for example the computer, it is possible to connect these components directly to the mains.

The actual status of the ControlUnit can be observed by LEDs on the front panel.



## Computer

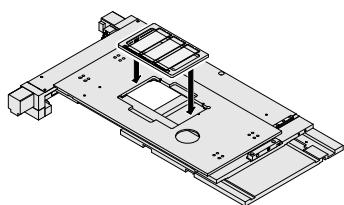
The system is equipped with a computer optimized for working with a PALM System and one or two flat screens or the unique PEN-Display. The computer itself is provided with a DVD-burner and an image handling software. With the integrated network card, you have the possibility to connect your computer with your local network. Optional a wireless keyboard and mouse is available (not for Japan). Consider that they can interfere with other electrical devices.

# Technical Information

## **PALM RoboStage II**

PALM RoboStage II is adaptable for the ZEISS microscope Axio Observer. The surface of the stage is even and is not constricted by engines or spindles. Holders for flexible applications like DishHolder or SlideHolder are available.

Changing of the various holders is convenient. With the CapCheck function a quality check of the microdissectates in the collection vessel is possible.



## **PALM CapMover II**

The motorized, software controlled PALM CapMover II was developed for fast positioning of the collecting device above the sample. Thus a quick exchange of the collecting device and high precision are perfectly combined.

For collecting from slides and dishes Carl Zeiss offers various collectors which can easily be changed by the users according to their special needs. All operations are controlled by the PALM RoboSoftware.

## **PALM RoboMover**

PALM RoboMover is the state of the art device for automated cell harvesting and sorting of different kinds of microdissected specimen at higher throughput. It enables you to automatically position collecting devices above your specimen. There are various collectors available for one or several caps or tubes, AmpliGrid or even collectors for microtiter plate formats. All PALM RoboMover functions are controlled by PALM RoboSoftware.

## **Fluorescence Attachment**

The fluorescence attachment expands your microscope to a fluorescence microscope. Optionally simultaneous fluorescence illumination with laser application is possible. High-power-coated beam splitters allow laser reflection as well as reflection of the desired fluorescence illumination wavelength. There is a motorized and a manually controlled configuration available.

## **ApoTome**

It provides a clear improvement in image quality and is advantageous 3D fluorescence microscopy. The slider for the field diaphragm plane of fluorescence illumination can now be integrated into PALM Systems and is controlled by the RoboSoftware.

## **Optovar**

A Carl Zeiss Optovar is an additional magnification unit for microscopes allowing 1.25x, 1.6x and 2.5x enlargement of the image. It is located directly under the objective revolver. It is recommended for visualization only.

## **PlasDIC**

PlasDIC is the first polarization-optical differential interference contrast method, which allows the use of plastic dishes for microscopic examinations of unstained living cells. It provides more information and details about the cells to be examined and allows better visualization of thick cells.

The low cost and easy-to-use technique from Carl Zeiss is ideal for microdissection or micromanipulation of living cells on the microscope with better depth of focus than conventional differential interference contrast methods.

# Technical Information

## Joystick

The ergonomic distortion-free joystick is a new hardware option to give full control over the sample you are inspecting. Fast and precise navigation on up to three slides, the culture dish or the recipient in check position.

Be independent from mouse or keyboard. Position the stage without checking the screen, so that you can focus on the microscope.

Even the RoboMover resp. CapMover II can be operated via the Joystick in the CapCheck position. The joystick function can be activated or deactivated whenever manual movement by Joystick is not suitable e.g. during Timelapse experiments and is verified by PALM RoboSoftware.

## Automated Scanning Function

PALM MicroBeam with a motorized microscope can be extended to an image processing and analysis system, if desired. According to the user's needs different image analysis modules for fast slide scanning, automated identification and object oriented analysis can be integrated, with subsequent laser microdissection.

## Digital Cameras

Pictures taken by a camera are transmitted to the computer via a frame grabber and are directly displayed on the monitor screen, allowing the observation of the microscope image while simultaneously controlling the stage functions.

You can store the transferred images on the hard disk of the computer or on another medium, e.g. DVD. For your special application you can choose between three different high resolution Zeiss AxioCam cameras, the MRm, MRc or ICc 1: for convenient laser micromanipulation as well as for fluorescence and color imaging, reduced light specimen or for life images. All cameras are compatible with the AxioVision imaging software.

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## **Carl Zeiss MicroImaging GmbH**

Location Munich

Kistlerhofstr. 75

81379 München, Germany

Phone: +49 (0) 89 90 9000-800

E-Mail: [palm-info@zeiss.de](mailto:palm-info@zeiss.de)

Web: [www.zeiss.de/microdissection](http://www.zeiss.de/microdissection)

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# Technical Information

## PALM Systems

### PALM RoboStage II



For micromanipulations like laser microdissection, an extremely precise positioning of the sample subject to the cutting laser is required.

Therefore PALM RoboStage II was developed. Higher throughput of samples can be realized now by using holders for up to 3 microscope slides. The extra width SlideHolder 50x1.0 can be used for large cuttings e.g. from brain. For working with DuplexDishes 35 and 50 optimized for microdissection of live cells, there are two different holders available. For MicroTweezers applications a capillary holder is available.

A so called "load position" is defined, for easy sample change. In this position the stage insert can be withdrawn powerlessly and any new kind of holder can be inserted.

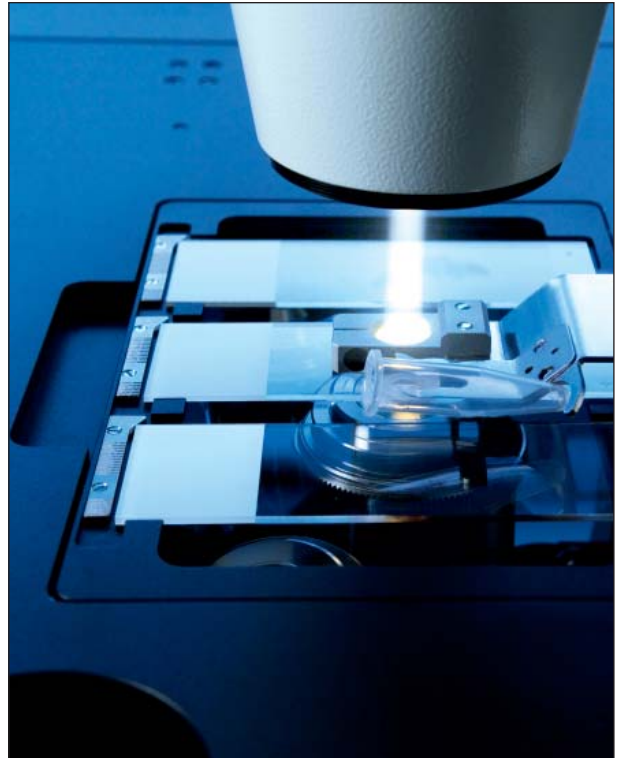
A separate "CapCheck" allows easy checking of microdissected and captured samples with collection devices recommended by Carl Zeiss. Using the "CapCheck" position the slide or dish has not to be removed from the stage.

A further outstanding feature is the reliable relocation by automatic positioning with absolute coordinates. An automatic spacer prevents damage by collisions with the optics.



# Technical Information

PALM RoboStage II is adaptable with the Zeiss Axio Observer microscopes. The surface of the stage is even and not constricted by engines or spindles. Due to convenient changing of the target holders, PALM RoboStage II enables a high sample throughput. For efficient operation, PALM RoboSoftware 4.2 or higher is recommended. If you want to upgrade your existing PALM System, please feel free to contact Carl Zeiss MicroImaging GmbH.



## Technical Information

Measurements: 459 x 305 x 31 mm  
Working range: 114 mm in x-direction,  
76 mm in y-direction

### Stage holders:

- for up to three slides 75-76 x 25-26 mm (DIN ISO 8037-1) at once, thickness: 1 mm or 0.17 mm
- SlideHolder 50x1.0 for double width slides 50x76 mm, thickness: 1 mm
- CapillaryHolder II
- DishHolder 50 CC (CapCheck) and DishHolder 35 CC (CapCheck) for small sample volumes
- DishHolder 6x35 mm to carry up to six 35 mm dishes
- user defined holders can be produced on request

Positioning accuracy: < 1  $\mu$ m  
Repetition accuracy: < 1  $\mu$ m  
Encoder release: 100 nm  
Speed range:  $\leq$  50 mm/sec  
Ambient air temperature: 20°C to 40°C (68°F to 104°F)

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## Carl Zeiss MicroImaging GmbH

Location Munich

Kistlerhofstr. 75  
81379 München, Germany  
Phone: +49 (0) 89 90 9000-800  
E-Mail: palm-info@zeiss.de  
Web: www.zeiss.de/microdissection

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# Technical Information

## PALM Systems

### PALM RoboMover



PALM RoboMover is a device for highly automated harvesting and sorting of different kinds of micro-dissected specimen in a higher throughput process. For each target well of a collecting device the kind and number of cells to be captured can be selected and the collection process can be operated automatically or manually, respectively.

PALM RoboMover is a fully 3D robotic unit which can travel freely within its boundaries. It is completely controlled by PALM RoboSoftware and can be equipped with different collectors. The height adjustment is in steps of  $\mu\text{m}$  and can be memorized after setting for routine work. This way, complex experimental setups can be planned and processed automatically.

#### **Automatic and easy**

- *Exact number of elements:*  
Place an exact number of elements into each microfuge cap or microtiter well.
- *Flexible application:* collection from slides or dishes.
- *Concentration series:* e.g. for determining detection limits, comfortably selected beforehand.
- *CapCheck:* instantly allows you to visually examine the microdissectate in the collection vessel.
- *Diffusor:* ensures you get the best possible image when working with slides or dishes.
- *CapturePlate 96:* combination with the microtiter plate. Wells can be filled with your own fill material or a biologically inert gel. The captured specimens are then centrifuged from the CapturePlate 96 into a microtiter plate for further analyses.
- *SlideCollector 48:* for combination of microdissection with the AmpliGrid technology without a transfer step.

# Technical Information

PALM RoboMover is the ideal supplement to PALM RoboStage II for the versatile allocation of lifted cells. It is adaptable to Zeiss Axio Observer. The device is dedicated to carry AdhesiveCaps, AdhesiveStrips 8C, CapturePlate 96, or an AmpliGrid AG 480F or can easily be adapted to new targets according to customer's requirements.



## Technical Information

Measurements: approx. 50x25x27 cm  
Weight: approx. 4.9 kg

Target collectors from Carl Zeiss MicroImaging:

- CollectorSets for single tubes and caps (200 µl or 500 µl)
- TubeCollector 8x500 or 8x200 for up to eight 500 µl or 200µl tubes
- CapCollector 12x8 for up to twelve AdhesiveStrips 8C
- CapturePlate Collector 96 for transfer from CapturePlate 96 to a microtiter plate
- SlideCollector 48 for AmpliGridAG480F
- customer specific collectors on request

Positioning accuracy: < 0.1 mm  
Repetition accuracy: < 0.1 mm  
Type of motor: stepping motors with 200 full steps per revolution  
Speed range: between 9.375 mm/sec and 85 mm/sec in x-/y- direction and 13 mm/sec in z-direction  
Collision detection: in all axes

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81379 München, Germany  
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Web: www.zeiss.de/microdissection

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# Technical Information

## PALM Systems

### Lasers

PALM Systems can be equipped with a cutting laser as PALM MicroBeam, a trapping laser as PALM MicroTweezers or a combination of both lasers in PALM CombiSystem.

Each single system is a class 1M laser device. Depending on the chosen system a cutting laser of laser class 3B and an trapping laser of laser class 4 is built in.

#### Cutting Laser - Wavelength 355 nm

The high beam quality theoretically allows nearly diffraction limited beam focusing. The laser is computer controlled and can be operated either automated with PALM RoboSoftware or manually with the foot switch. It is air-cooled, compact, sturdy, reliable, maintenance-free and requires only a common power supply.

*FTSS laser (Frequency tripled solid state laser):*

wavelength 355 nm  
pulse energy  $\geq 90 \mu\text{J}$   
pulse duration  $< 2 \text{ nsec}$   
pulse frequency max. 100 pulses per second  
beam divergence 3 mrad  
pulse frequency of laser control 1 to 100Hz

#### Trapping Laser - Wavelength 1064 nm

PALM CombiSystem has an integrated trapping laser with different single beam or double beam options:

- Mono: one fixed laser beam
- MonoFlex: one flexible laser beam
- DuoFlex: double laser beam; one flexible laser, one fixed laser beam
- TwinFlex: double laser beam; two flexible lasers

For PALM MicroTweezers only the configuration Mono or DuoFlex is possible. Advanced fluorescence filters are required.

For further laser options, please contact Carl Zeiss MicroImaging.

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A near infrared diode pumped solid state laser which has a high beam quality is used as trapping laser. The laser is computer controlled and can be operated either automated with PALM RoboSoftware or manually with the foot switch and requires only a common power supply. They are air-cooled, compact, sturdy, maintenance-free and reliable. The required trapping power depends on the polarizability of the specimen, its own motility, the viscosity of the culture medium or cytoplasm and on the chosen energy and focus settings of the laser beam. To work with the trapping laser it is mandatory to use a vibration isolated table (ask Carl Zeiss for details).

Depending on your application you can choose between two trapping lasers with different power output. We recommend to use the 1.5 W laser for beads and bacteria and the 3W laser for sperms and cells or when working at higher speed. If you want to work with the stage holder CapillaryHolder II you will have to use the 3W laser.

*Diode pumped solid state laser - 1.5 W or 3 W:*

wavelength 1064 nm  
power 1500mW/ 3000 mW  
transverse mode TEM<sub>00</sub>,  $M^2 < 1.1$   
beam divergence ( $l/e^2$ )  $< 1 \text{ mrad}$   
beam diameter ( $l/e^2$ ) 2.5 mm  
frequency 47-63 Hz  
voltage 90-132, 180-264 VAC

#### Carl Zeiss MicroImaging GmbH

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Kistlerhofstr. 75  
81379 München, Germany  
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E-Mail: palm-info@zeiss.de  
Web: www.zeiss.de/microdissection

# Technical Information

## PALM Systems

### **PALM CombiSystem - Fluorescence**

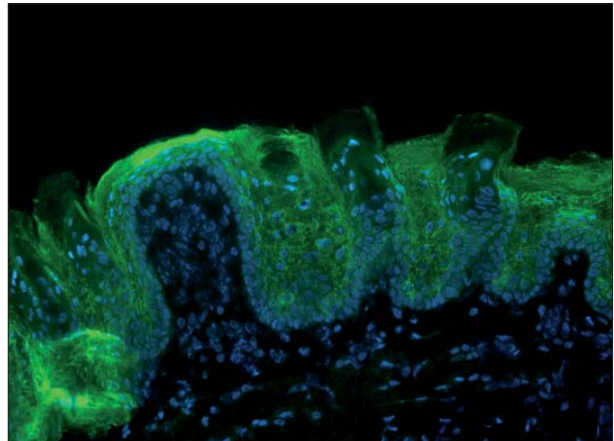
#### **Fluorescence Attachment**

Carl Zeiss MicroImaging has developed a fluorescence attachment which expands your PALM System to a fluorescence microscope. Especially designed high-power-coated beam splitters allow simultaneous laser reflection as well as reflection of the desired fluorescence illumination wavelengths.

A very special feature is the possibility of freezing the fluorescence image on the screen with the PALM RoboSoftware tool "Freeze Mode". Thus bleaching effects of the sensitive samples can be avoided while analyzing the fluorescence of the sample and defining the laser cutting lines is possible.

After exiting the "Freeze Mode" any laser function for cutting and catapulting the already marked elements can be activated under normal microscope illumination. With the new software tools multichannel fluorescence and extended focus work in Freeze Mode is possible too.

You can extract samples from different spots calculated from the AxioVision software. When laser functions with simultaneous fluorescence illumination are not required, the software tool also allows the use of a basic fluorescence attachment without the need of a motorized filter wheel and special filter sets. With the motorized Axio Observer microscope from Carl Zeiss the filter change and shutter operation are controlled with PALM RoboSoftware which provides user friendly and timesaving working conditions.



*Tongue epithelium  
(Rat, Anti-Cytokeratin-FITC, DAPI)*

# Technical Information

*Depending on specific customer requirements Carl Zeiss offers two different possibilities of fluorescence attachment:*

## **Basic Fluorescence Attachment**

(for PALM MicroBeam with Axio Observer from Carl Zeiss):

simultaneous fluorescence observation and laser functions are not possible, resp. wanted. Depending on the type of microscope, the handling of the filter revolver for filter change and cutting position is done manually.

### Advantage:

Favorable price as no motorized filter wheel and special filter sets are required.

### Fluorescence hardware components:

HBO lamp: self adjusting with lamp mount and collector including heat reflecting filter, automatic lamp alignment  
(or) X-Cite 120: FL light source incl. illuminator, lamp module, light guide  
(or) HXP 120 with integrated shutter with trigger capability  
(or) Colibri with up to 4 LED modules  
Uni Blitzshutter  
Selected Basic Fluorescence filter set

### Options:

The Basic Fluorescence Attachment can be used with several options. Not for simultaneous use with PALM MicroTweezers. For specific recommendations, please contact Carl Zeiss MicroImaging.

*Please note: The basic fluorescence attachment is suitable for fixed samples only.*

## **Advanced Fluorescence Attachment:**

Simultaneous laser functions and fluorescence illumination are provided.

### Advantage:

Quick motorized filter changes and high speed fluorescence applications are possible.

### Fluorescence hardware components:

Fluorescence lamp: HBO lamp or X-Cite120 or HXP 120 or Colibri  
Motorized filter wheel  
Selected Advanced Fluorescence filter set

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Location Munich

Kistlerhofstr. 75  
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Phone: +49 (0) 89 90 9000-800  
E-Mail: [palm-info@zeiss.de](mailto:palm-info@zeiss.de)  
Web: [www.zeiss.de/microdissection](http://www.zeiss.de/microdissection)

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# Technical Information

## PALM Systems

### Cameras

#### AxioCam ICc1



Operates without moveable lens systems and correction procedures and sends the images without distortion directly to your PC via FireWire. Perfectly integrated into PALM RoboSoftware as well as into AxioVision imaging software, you will be impressed by the fast live image on the monitor. A good value option for acquiring color images.

#### AxioCam MR



Fluorescence and color imaging at a sensible price. Low-intensity fluorescences, living organisms and finely structured material surfaces – the image quality of the AxioCam MR clearly exceeds that of other monochrome and color CCD cameras. With a dynamic range of more than 1:2200, the highly sensitive 2/3" CCD sensor acquires up to 14 images per second in full resolution. For applications in fluorescence microscopy, we recommend the AxioCam MRm monochrome variant – for maximum resolution without color interpolation and without a light-reducing filter mask.

#### Model AxioCam ICc1

- |                         |   |
|-------------------------|---|
| 1. CCD basic resolution | 1392 x 1040 = 1,4 Mega Pixel                  |
| 2. Pixelsize            | 4,65 µm x 4,65 µm                             |
| 3. Sensor Size          | Chip area 6,3 mm x 4,8 mm, equivalent to 1/2" |
| 4. Filter mask          | RGB Bayer color filter                        |
| 5. Live Image           |   |
| Max. Framerate          | Modus      Horiz. x Vert.                     |
| 17 Frames/sec           | Progressiv 1392 x 1083                        |
| 28 Frames/sec           | ROI         768 x 520                         |
| 30 Frames/sec           | ROI         600 x 480                         |
| 6. Analog Gain          | Available                                     |
| 7. Interface            | FireWire 1394a                                |

#### Model AxioCam MR

- |                         |   |
|-------------------------|---|
| 1. CCD basic resolution | 1388 x 1040 = 1,4 mega pixels               |
| 2. Pixel size           | 6,45 µm x 6,45 µm                           |
| 3. Sensor Size          | 8.9 mm x 6.7 mm, equivalent to 2/3"         |
| 4. NIR-Mode)            | MRm: Mode for higher sensitivity in near IR |
| 5. Live Image           |   |
| AxioCam MRc             |   |
| Max. Framerate          | Modus      Horiz. x Vert.                   |
| 11 Frames/sec           | slow       1388 x 1040                      |
| 26 Frames/sec           | medium     460 x 344                        |
| 38 Frames/sec           | fast        276 x 208                       |
| AxioCam MRm             |   |
| Max. Framerate          | Modus      Horiz. x Vert.                   |
| 11 Frames/sec           | slow       1388 x 1040                      |
| 21 Frames/sec           | medium     692 x 520                        |
| 31 Frames/sec           | fast        460 x 344                       |
| 6. Interface            | FireWire 1394a                              |
| 7. Dynamic Range        | Typical >2200 : 1                           |
| 8. Exposure times       | 1 ms up to 20 s                             |
| 9. Cooling              | Single stage Peltier-cooling                |

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#### Carl Zeiss MicroImaging GmbH

Location Munich

Kistlerhofstr. 75

81379 München, Germany

Phone: +49 (0) 89 90 9000-800

E-Mail: palm-info@zeiss.de

Web: www.zeiss.de/microdissection

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# Technical Information

## PALM Systems

### LCD PEN-Display Cintiq 21" UX



The LCD PEN-Display is a sensitive touch screen to be used to easily operate PALM systems and to allow targets to be selected and marked on-screen with a special pen.

In order to increase your efficiency, the Cintiq 21UX features the new ExpressKeys and Touch Strips which allows you to reduce keyboard usage and to concentrate on the PEN-Display as your main working tool. The ExpressKeys have the most important PALM RoboSoftware menu commands already preset, but are also freely programmable by yourself. It can be used exclusively or in combination with a standard monitor.

Please consider that you will need a larger table than for a standard PALM System.

#### Technical Information

- PALM RoboSoftware Rel. 4.2 is required, for PALM RoboSoftware 4.0 or less: Not all short cuts put on ExpressKeys and TouchStrip are available
- Overall Dimensions (excluding stand) 535 mm x 418 mm x 48 mm
- Weight (including stand) 10.2 kg
- Stand Completely removable, Rotation up to 180° right / left, Incline 10° – 60°
- Type: TFT active matrix LCD
- Screen: Size 54.2 cm (21.3")
- Display Area: 432 mm x 324 mm
- Resolution: UXGA (1,600 x 1,200 pixel)
- Colour Depth: 16.7 million colours (24 bit)
- Contrast Ratio 550:1

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Location Munich

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E-Mail: [palm-info@zeiss.de](mailto:palm-info@zeiss.de)

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# Technical Information

## PALM Systems

### PALM RoboSoftware

#### Powerful and intuitive functions for PALM MicroBeam and PALM MicroTweezers

PALM RoboSoftware is designed with a philosophy that focuses on simplicity and convenience.



The new software will now be offered in two modes:

- For routine applications and ease of use, delivered with every system as **PALM RoboSoftware**
- **PALM RoboSoftware Pro** as an upgrade module for additional features like Autofocus, TimeLapse and Field-of-View analysis
- One button selection between RoboSoftware and RoboSoftware Pro

Both versions have new software tools for guided trapping with PALM MicroTweezers.

PALM RoboSoftware is perfectly tailored to fit your individual needs:

- Optimized arrangement of hardware dialogues for best sample selection
- Hardware settings for individual setups (e.g. Colibri, fluorescence)

#### Main Window

Well arranged main window: microscope management on the left, laser management on the right and selection/ processing of cutting elements at the bottom.

- Display of the microscope image is recorded in live mode with a digital camera
- Software controlled movement of the stage
- Processing of defined elements (lines and areas): automated laser cutting along defined lines followed by lift-up process
- Measurement of dimensions (length and area)
- Saving and loading the position of defined elements
- Save images for documentation
- Loading and saving of settings: laser settings, elements, movement speed of the stage etc.
- "One button quality control": with CapCheck you can see your microdissected specimen

#### ElementList

- The ElementList window provides a summary of all selected elements in tabular form
- Check various parameters, change them and activate required functions
- Assign objective and collection device to corresponding elements

#### Navigator

The Navigator provides you with an overview image of the sample

- Precise definition of the scanning field with a minimum of mouse clicks
- Easy positioning: one mouse click with the pointer on the target and the stage moves to the indicated position

# Technical Information

## InformationCenter

InformationCenter works in two modes:

- the standard **File Mode** and the upgraded **Database Mode**:
- Reproducible microdissection with professional documentation
- Display of the sample data for retracement
- Record of specimen type, choice of elements and type of specimen retrieval
- Slide show

## RoboMover functions for more automation

To position collection devices over your samples and in order to automate complex experiments:

- Exact positioning of the collection vessel: initialized manually or choose different operating modes (e.g. number of elements per field) for automatic vessel change
- Record of used wells
- Area based distribution in different collection devices

## Pattern Preserved Microdissection (PPM)

- Define chessboard shape by drawing one big rectangle (e.g. 3 rectangles horizontal x 3 rectangles vertical = 9 elements)

## More convenient integration of AxioCam series

- Sensitivity and high resolution digital imaging
- For brightfield and fluorescence applications
- Detection of even weak fluorescence signals
- Rapid live image
- Camera dialogues with adjustment of integration time, auto exposure, etc. and histogram
- Autoconfiguration for fast live image optimization

## Multichannel Fluorescence (MCF) and Extended Focus (EF)

Features for superb imaging: Generate single or multichannel images for up to five different colors (MCF) or extract the sharp details from each focus plane to calculate a final image that is sharp in every detail (EF).

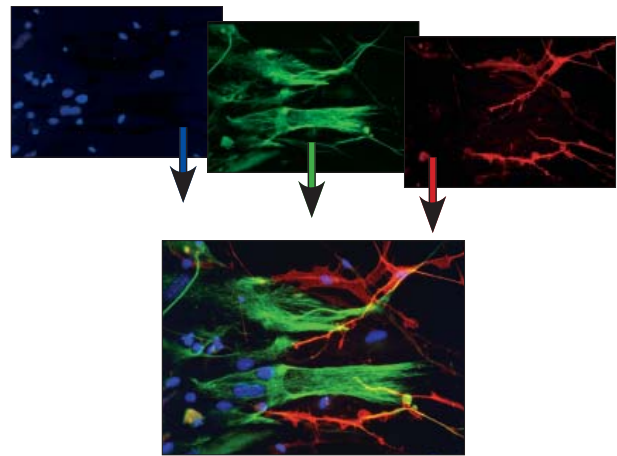


Figure 2: Multichannel Fluorescence

## Temperature control of Incubator XL PALM S1

The software controlled thermostat guarantees a stable environment for live cells.

## Tweezers functions

For manipulation of cells as well as to trap, move and sort microscopic particles. Software control of one or two fixed or flexible laser beams:

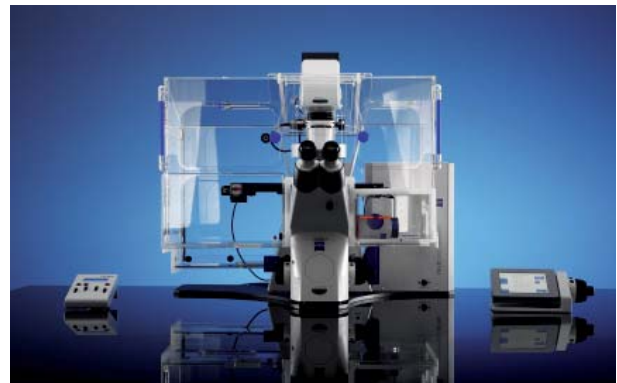


Figure 3: PALM MicroTweezers with Incubator XL PALM S1

# Technical Information

## **PALM RoboSoftware Pro**

Customers find a more advanced navigation of all hardware features that allows greater customization to experimental demands:

- More functionality on GUI for advanced experiments
- Field-of-View image analysis using „AV AutoMeasurement“
- PALM module TimeLapse for free
- PALM module Autofocus for free

## **New drawing and cutting tools**

- 3D cutting: After first cutting laser changes automatically to next focus plane for second cut, etc.
- Element copy/paste of same shape (Stamp)
- CenterRoboLPC: Freehand Element with Center Dot

## **New software tools for guided trapping**

- Guided trapping and moving along an element (e.g. line, etc.)
- Guided trapping and moving with stage from A to B (all over sample)
- Guided trapping and moving from A to B in field of view
- Moving beam or stage as Joystick function

Upgrade possibilities with Imaging components using known and accepted Carl Zeiss components (Colibri, AxioVision)

PALM Systems with PALM RoboSoftware 3.2 or higher can be upgraded to newest version.

### *Regulatory Notice:*

*PALM Systems are intended for research use only and are not approved for medical applications in the United States and Canada. PALM Systems are class 1M laser devices with no need for special laser safety requirements during operation.*

## **Carl Zeiss MicroImaging GmbH**

Location Munich

Kistlerhofstr. 75

81379 München, Germany

Phone: +49 (0) 89 90 90-800

E-Mail: [palm-info@zeiss.de](mailto:palm-info@zeiss.de)

Web: [www.zeiss.de/microdissection](http://www.zeiss.de/microdissection)

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# Technical Information

## PALM Systems

### PALM MicroBeam - Applications

Understanding cellular mechanisms and intercellular communication are some of today's most important areas of study. To conduct reliable scientific analysis we need to study key molecules such as DNA, RNA and proteins from pure specimens.

PALM MicroBeam with its contact-free LCM technology offers a key tool for producing pure, contamination-free and hence clearly defined specimen material and even living cells for analysis or recultivation. Regardless of what source material is used. There are no limits, either in the choice of specimens, preparation or staining techniques.

#### Sources and preparation:

- Histological specimen from glass or membrane coated slides
- Living cells or cell cultures from a culture dish
- Chromosomes and Cytospins
- Fluorescence specimens
- Cryofixation or FFPE material
- Stained or unstained

New discoveries in life sciences with greater efficiency in daily practice – PALM Systems will open up incredible new possibilities from pathology to forensics, from genomic and proteomic analysis to stem cell research.

#### Unlimited subsequent analyses:

- Analyze DNA, RNA and proteins
- Microarrays
- Recultivate live cells
- Select efficiently from heterogeneous cell cultures
- Micromanipulate living human, animal or plant cells

#### Wide-ranging research activities:

A wide range of source material means high flexibility. With PALM MicroBeam you can:

- Retrieve whole tissue regions for oncological studies
- Selectively target individual cells such as neurons in tissue or for cytological research
- Isolate individual particles, fetal cells, sperm cells or chromosomes for e.g. forensic purposes
- Identify and retrieve individual cells from cytopspins and smears

As a special service to our customers we provide our scientific application service. Our team with highly qualified scientists can offer years of experience in microdissection and other laboratory techniques to help you in your work.

For detailed information and a complete list of our services, send any questions to: [palm-labs@zeiss.de](mailto:palm-labs@zeiss.de)

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