Laser microtome LMT F 14

ROWIAK

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Precise, non-contact cutting

The laser microtome LMT F14 is designed to slice biological tissue and various materials with high precision. It is suited for applications in life science as well as in micro technology.
Equipped with femtosecond laser technology, the LMT F14 offers a wide range of advantages:

- Non-contact processing
- Submicrometer precision
- Cutting of tissue in its native state
- No time-consuming tissue preparation
- Fewer artifacts
- No thermal damage

laser microtome
- LMT F14

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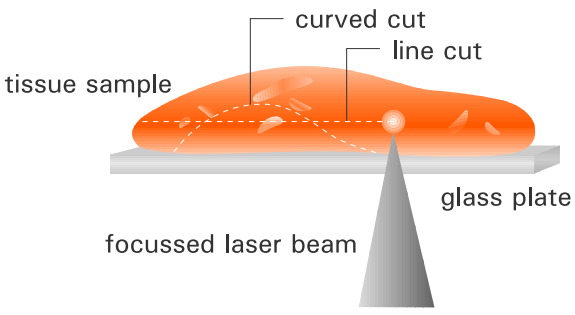
Microtomy with innovative laser technology

The cutting process is performed by a femtosecond laser, emitting radiation in the near-infrared range. By tight focussing the laser radiation, intensities over 10 GW/cm² arise inside the laser focus. These extreme intensities ionize the illuminated material and lead to the formation of a plasma. Accompanied by a shock wave this causes the disruption of the material. This effect is called optical breakdown or photodisruption. Due to the ultra short laser pulse duration of only a few femtoseconds (1 fs = 10^{-15} s), there is only very low energy of a few nano joules (1 nJ = 10^{-9} J) per laser pulse deposited into the tissue. This limits the interaction range to diameters below one micrometer. As this effect is based on nonlinear absorption, the optical breakdown is not necessarily limited to the surface of the specimen. Cutting can be realized even inside the tissue or material by focussing the laser beam into deeper regions.
In conjunction with a fast scanning unit an effective and non-contact sectioning method is available. Depending on the material being processed, slice thicknesses of about 5 to 100 μm are feasible.



Principle of the laser microtome: The focussed laser beam writes a cutting plane into the sample. The laser microtome offers cutting of flat lines as well as cutting of any other shape.

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Versatile Applications

Whether biological tissue or materials,
such as ceramics or polymers – the laser microtome is a multi-purpose sectioning instrument.
In particular, the ability for non-invasive processing of living tissue opens a wide range of applications in the field of life science, for example in biology, pathology or medicine. The LMT F14 is also well suited for applications in micro technology and materials research.

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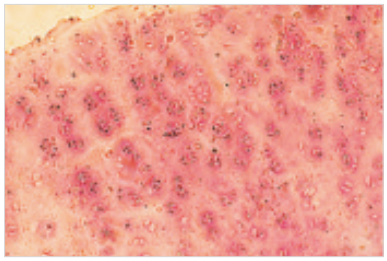

pig cartilage

No time-consuming tissue preparation

In contrast to conventional, mechanical microtomes, the LMT F14 does not require extensive and time-consuming sample preparation techniques such as freezing, dehydration, embedding in resin or paraffin or even decalcification, as it is usual with hard tissue. It has the ability to slice almost every tissue in its native state. The laser microtome is a good solution for sectioning living tissue or tissue which is sensitive to chemical fixation.
The processing of a sample is possible within a short time. For a maximum area of 14 x 14 mm the LMT F14 needs about three minutes.
Further advantages are the significant reduction of artifacts and contamination-free specimens, which results from the non-contact cutting method.

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Easy of use

- The LMT F14 is a stand-alone device. No auxiliary equipment is needed.
- A built-in camera enables monitoring of the cutting process.
- An intuitive touch interface provides very comfortable handling.

Configuration

Laser	Average output power	< 5 W
	Wavelength	1064 nm
	Pulse width	< 300 fs
	Pulse repitition rate	15 MHz
Camera	Sensor type	1/2" CCD, B/W
	Videorate	
	Field of view	ca. 0,9 x 0,9 mm
Software	Labview based	

Technical parameters

Section thickness	Minimum 5 to 10 µm, Maximum depends on the material
Process duration	ca. 1mm² / s
Working area	14 x 14 mm (larger areas on request)
Dimensions	500 x 1200 x 600 mm (H/W/D)
Weight	ca. 100 kg

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